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EXperimental design Protocol for Long-term Operational Response Evaluations (EXPLORE)

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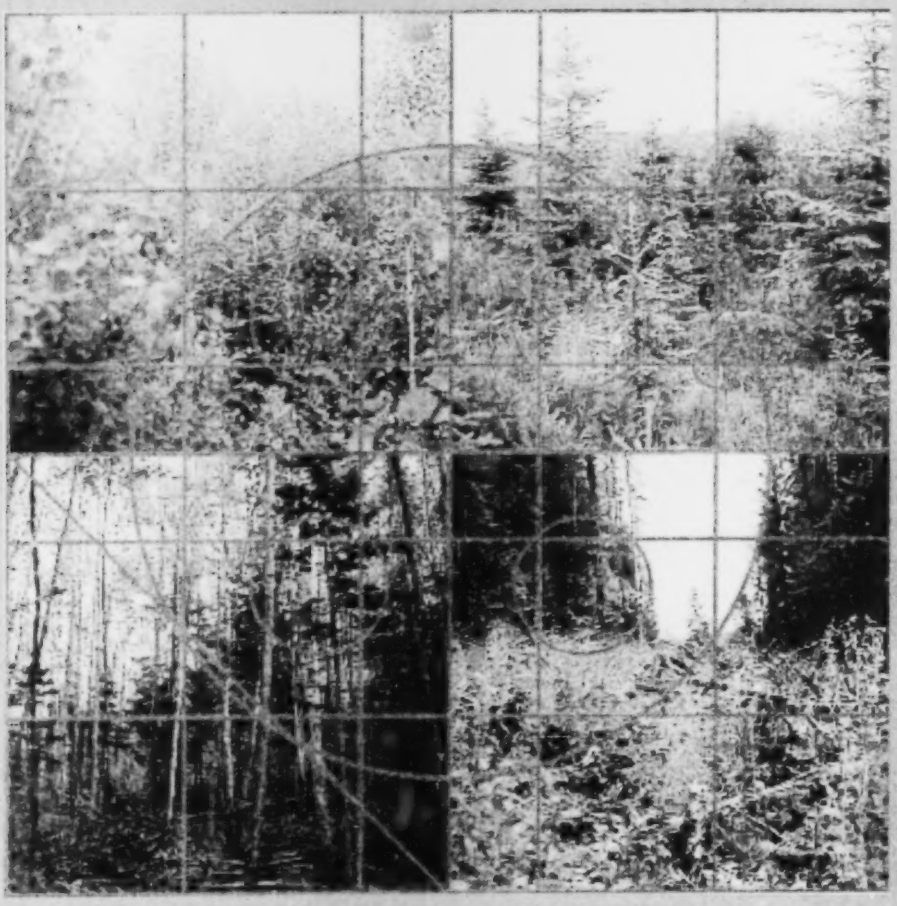

BRITISH COLUMBIA

Ministry of Forests Research Program

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EXperimental design Protocol for Long-term Operational Response Evaluations (EXPLORE)

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ABSTRACT

Over the 15-year period from 1981 to 1995, a total of 586 672 hectares of Crown forest land received brushing treatments at a cost of approximately $243 million. Approximately 75 000 hectares of forest land require brushing treatments each year. Some information is available on the short-term (2–3 year) impacts and benefits of commonly used treatments in reforested clearcuts. However, little information is available on the long term effects of vegetation management practices on achievement of management objectives, including free-growing, green-up, stand development, growth, or yield objectives, especially under different silvicultural systems. Better information is required on how common practices affect biodiversity and habitat values to provide a basis for evaluating and selecting treatment options. There is also a critical need to examine the value and impacts of vegetation management treatments applied in a range of silvicultural systems, particularly systems that involve various levels of canopy retention.

Broadleaf species are a common component of most low- and mid-elevation forests in British Columbia. Maintenance of the broadleaf component in these forests is desirable for a number of reasons, including improved nutrient availability, increased species and structural diversity, and increased timber yield. However, experience and information about managing mixedwood forests in B.C. is limited. Studies are needed to document the effects of a range of silvicultural systems and mixedwood management strategies on stand dynamics, growth and yield, and non-timber resource values.

The EXperimental design Protocol for Long-term Operational Response Evaluations (EXPLORE) provides a methodology for establishing long-term studies to document impacts of vegetation management and mixedwood management strategies. In each installation, at least one pair of plots (consisting of an untreated control or legacy plot and a treatment plot) is established. Replication is achieved by applying each treatment at several different installations. The option to establish additional plots for additional treatments is provided for in the protocol. Treatment plots are a minimum of 0.49 ha (70 × 70 m). Within each treatment plot, a set of measurement plots and transects are used for data collection. Data is collected to document (i) vegetation development, (ii) growth of individual seedlings, saplings, or trees, (iii) stand dynamics, (iv) stand structure, (v) coarse woody debris, (vi) soil disturbance, (vii) plant species diversity, and (viii) growth and yield of crop trees.

The network of installations established in various vegetation complexes and forest types using this protocol will provide valuable demonstration sites and useful data on stand development and treatment impacts.

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1 INTRODUCTION

Vegetation management is considered necessary to ensure successful establishment and growth of many reforested areas in British Columbia. Over the 15-year period from 1981 to 1995, a total of 586 672 ha of Crown forest land received brushing treatments at a cost of approximately $243 million. During 1995/96, approximately 65 872 ha of Crown forest land received brushing treatments to ensure establishment and growth of young seedlings at a cost of $30 million. Treatments involve manual cutting (59%), herbicides (29%), and sheep and cattle grazing (12%). In addition, site preparation treatments are applied to approximately 112 218 ha annually to reduce slash, prepare sites for planting, encourage natural regeneration, and control vegetation. Brushing first became an integral part of the strategy for reforestation success after the Forest Act (1979) landmark amendments in 1987, when reforestation was legislated an obligation for those given the privilege of harvesting Crown timber. Over the last ten years (1986–1996), brushing levels have tripled and will remain high due to the need to establish free-growing forests in British Columbia.

During the past decade, several studies have been undertaken to evaluate the effectiveness of various treatment options. Some studies provided information on the short-term responses of conifers 3–10 years after treatment. However, these studies do not adequately encompass the full range of sites, treatments, vegetation complexes, and coniferous species found in B.C. In addition, few of these studies were designed to provide medium- or long-term data relating to issues such as achievement of free-growing, green-up, growth and yield, biodiversity, stand dynamics, or stand structure. This information is required as a basis for evaluating treatment options and for decision-making.

In British Columbia, clearcutting is the predominant silvicultural system used to regenerate second-growth forests and studies to date have focused on vegetation management in clearcuts. The public demand to use more natural management systems and to manage for more complex and diverse objectives (e.g., biodiversity, wildlife and fish habitats, water quality, recreation, visual quality) has led to considerable interest in alternative silvicultural systems. The choice of silvicultural system for a given forest type is based on such factors as stand biology, stand development, ecological site classification, knowledge of succession and wildlife, landscape visual quality objectives, biological diversity, hydrology, and operational factors. A harvesting system that would approximate natural disturbance regimes will help to preserve ecosystem processes and maintain ecosystem productivity. However, in mixed stands, selection of an appropriate silvicultural system is complicated because different tree species have unique regeneration requirements and respond differently to the environmental and physical conditions created by particular systems (B.C. Ministry of Forests 1996). As a result, there is a critical need to understand the short-term and long-term impacts of partial-cutting silvicultural systems on forest regeneration and non-crop vegetation development. There is also a need to examine the value and impacts of vegetation management treatments applied in a range of silvicultural systems, particularly systems that involve various levels of canopy retention.

In addition to stands of mixed conifers, broadleaf and conifer mixtures are also found throughout much of the forested area of British Columbia. Six broadleaf tree species (trembling aspen, paper birch, balsam poplar, black cottonwood, red alder, and bigleaf maple) are common mixed with conifer species. Mixedwood and broadleaf forests represent approximately 35% of the area of productive forests in B.C. (Comeau 1996). Current forest legislation in British Columbia (such as the B.C. Forest Practices Code) requires that mixedwood forests be managed as such because broadleaf trees contribute to forest health, nutrient cycling, stand yield, biodiversity, and wildlife habitat. However, experience with mixed-stand management in B.C. is currently limited and few sources of data are available on the growth and development of mixed stands or on the effects of various silviculture practices or silvicultural systems on stand development, growth and yield, biodiversity, and habitat characteristics. Short- and long-term data are required for the range of mixed stands and ecosystems in the province under various silvicultural systems to ensure the sustainable management of these forest types (Comeau 1996; Comeau et al. 1996).

Although much of this information can be obtained from vegetation and mixed-stand management research experiments, these experiments are large and expensive when designed to provide long-term data. In addition, treatment responses studied for research purposes are often different from information required for "operational" treatments. In most research experiments, replication is achieved on a single site, which limits the ability to transfer results to a range of sites. Also, the large plot size required for long-term growth and yield studies makes it difficult to find sites large enough for replicated experiments with several different treatments. An alternative to replication is to systematically "monitor" operationally treated areas, which includes establishment and measurement of untreated control or legacy areas as well as silviculturally treated areas.

2 BACKGROUND

Four protocols are currently used in British Columbia for acquiring information on crop and non-crop vegetation responses to operational brushing treatments. The protocols, which are described in more detail below, are Operational Herbicide Monitoring (OHM), the Unified System of Silviculture Monitoring (USSM), Treatment Regime Evaluation—Numerical Decision Support (TRENDS), and Protocol for Operational Brushing Evaluation (PROBE). In addition, protocols are also available for monitoring impacts of silvicultural treatments on wildlife habitat (Habitat Monitoring Committee 1996) and for measuring effects of silvicultural treatments on tree growth and yield (B.C. Ministry of Forests 1992). A protocol has also been developed for acquiring data for modelling Douglas-fir response to vegetation management treatments in the Pacific Northwest (Shula and Knowe 1991). Each protocol has been developed to meet particular information needs.

The purpose of Operational Herbicide Monitoring (OHM) (Hays 1990) is to obtain data on crop tree and vegetation responses to operational

herbicide treatments in the Prince George Forest Region. The OHM protocol provides methodology for measuring crop seedlings, target vegetation, and wildlife habitat. Each OHM installation consists of one untreated control plot and one treated plot. Total plot size is approximately 1 ha (100 × 100 m) with a minimum 10 m buffer on all sides (20 m buffer where practical). Within each plot, 100 crop trees are selected for measurement on a 10-m grid. Target vegetation response is measured at 20 systematically selected grid points using .0005 ha (1.26 m radius) subplots. Habitat and plant community information is documented using two 0.02 ha circular macro-plots in each plot (Habitat Monitoring Committee 1990). At present, approximately 18 OHM installations have been established and measured in the Prince George Region. While the present design is focused on individual crop tree responses, fixed-area plots could be established within the OHM treatment plots to provide area-based growth and yield data.

The Unified System of Silviculture Monitoring (USSM) (NIVMA 1990) was designed to provide data on the effects of alternative treatments on crop tree performance and competing vegetation. This protocol is being used by members of the Northern Interior Vegetation Management Association (NIVMA) in Prince George, Prince Rupert, and Cariboo Forest Regions, where 846 installations have been established using this protocol. An installation consists of 100 sample trees distributed within a minimum of sixteen 0.005 ha (3.99 m radius) survey plots. Survey plots are located on a grid with 4 plots in each row and 10 m between each plot. Information on competing vegetation is collected at 32 of the sample trees (2 trees in each plot) in 0.0005 ha (1.26 m radius) tree-centred sub-plots. USSM installations are only required to include one "treatment" (treated) plot, although many do in fact include both treated and untreated (control) plots on the same opening. No provision is made in the USSM system for acquiring habitat data or area-based growth and yield measurements, but they could be added where treatment areas are of sufficient size.

Recently, NIVMA (1996) revised the USSM protocol and developed a new monitoring protocol called TRENDS (Treatment Regime Evaluation—Numerical Decision Support) (NIVMA 1996). TRENDS is designed to address specific monitoring objectives by acquiring data on short-term and long-term effects of various silviculture regimes on crop and non-crop species, as well as site characteristics. One 0.09 ha (30 × 30 m) plot is established before harvesting and data is collected for stand condition, composition, and volume. Plant community information is collected on four 0.023 ha (15 × 15 m) plots. Following harvest, a minimum of 36 crop trees are selected on a 2.5 m grid; non-crop trees, if required, can be selected on this grid as well. Data on competing vegetation is collected on 0.0003 ha (1 m radius) crop tree-centred subplots. The protocol can also be used for non-random paired-plot applications. Approximately 100 random landscape representation and 20 paired-plot installations have been established to date. The database is intended to provide information for use in timber supply analysis, to review the free-growing definition and silviculture policy, and to provide treatment efficacy data.

The Protocol for Operational Brushing Evaluation (PROBE) (Simard 1993) has been in use in Kamloops and Nelson Forest Regions since 1991. The purpose of this protocol is to provide information on the responses

to operational brushing treatments of crop trees, target non-crop vegetation, and plant communities (habitat). Each **PROBE** installation consists of at least two plots (one untreated control and one treated plot). Each plot is a minimum of 0.81 ha. Within each plot, 36 crop trees, spaced approximately 10 m apart and at least 20 m from the plot boundary, are selected as measurement trees. Each selected tree also serves as the subplot centre for assessing neighbouring vegetation. Neighbouring species are assessed within 0.001–0.002 ha (1.78–2.52 m radius) subplots centred at each crop seedling. Habitat and range information is recorded within 0.005 ha (3.99 m radius) subplots centred on four of the 36 crop seedlings, following procedures described by the Habitat Monitoring Committee (1990). The severity of broadcast prescribed fire and mechanical site preparation treatments are measured using modified line- and gridpoint-intercept procedures. Eighty **PROBE** installations were established from 1991 to 1995. As with **USSM** and **OHM**, area-based growth and yield data are not collected in **PROBE** plots, but fixed-area growth and yield plots could be established within each plot to provide this data.

The protocol developed by Shula and Knowe (1991) provides data needed for development of a Regional Vegetation Management Model for the Pacific Northwest (**RVMM**). The purpose of this project was to develop a model for predicting both tree-level and stand-level (growth and yield) responses of Douglas-fir and associated species to vegetation management treatments. Models are being developed to predict responses. The **RVMM** protocol is designed to obtain data retrospectively from areas that have been treated in the past; consequently, there are no requirements for pairing treated with untreated areas. Each **RVMM** installation consists of a square or rectangular permanent measurement plot (0.04–0.06 ha) that contains at least 45 crop trees. Within each permanent measurement plot, four 0.004 ha competition measurement plots are established to collect the information on all non-crop species. This protocol has the potential to satisfy needs for collecting tree, vegetation, and growth and yield data response. The primary limitations associated with this approach are the lack of paired treated and untreated plots in the same opening, and the small size (and small number of crop trees) of the measurement plots.

The systems summarized in this section use different methods for collecting data on crop responses to silvicultural treatments, but each system can provide useful information on treatment effects for particular research and monitoring objectives. Table 1 summarizes the systems discussed in this section and compares the **EXPLORE** system.

3 RATIONALE

A single comprehensive approach is not currently available for addressing mixedwood and vegetation management issues associated with alternative silvicultural systems in British Columbia. Timing of installation establishment plays a key role in providing information on site and stand dynamics. Installations established before stand harvesting provide data needed to interpret early successional vegetation development after harvesting.

TABLE 1 *Summary of protocols used for collecting data*

Characteristics	OHM	USSM	PROBE	RVMM	TRENDS	EXPLORE
Protection buffer	≥10.0 m	50.0 m	30.0 m	—	variable	30.0 m
Treatment plot area	1.21 ha	0.36 ha	0.81 ha	—	variable	0.49 ha
Treated buffer (within treatment plot area)	20.0 m	15.0 m	20.0 m	—	variable	10.0 m
Treatment evaluations	mandatory	optional	mandatory	mandatory	optional	mandatory
Pre-harvest assessments	—	—	—	—	Yes	Yes
Pre-treatment assessments	Yes	No	Yes	—	Yes	Yes
Tree measurement plot size	1.21 ha*	0.005 ha	0.49 ha†	0.05±0.01 ha	0.09 ha	0.1 ha
Vegetation monitoring plot size	0.0005 ha	0.0005 ha	0.001–0.002 ha	0.004 ha	0.023 ha	0.005 ha
Vegetation monitoring plot number	20	2	36	4	4	4
Gridpoints per treatment	100	16	36	No	36	36
Soil disturbance assessment plot (site preparation)	—	—	36 subplots (r = 1 m)	—	2–180 m transect lines	50 m transect lines
Habitat monitoring plots per treatment	2	—	4	—	No	4
Habitat monitoring plot size	0.02 ha	—	0.005 ha	—	—	0.005 ha
Coarse woody debris assessments	—	—	Yes	—	Yes	Yes
Biodiversity monitoring	Yes	optional	Yes	—	Yes	Yes
Compatibility with growth and yield	No	No	No	Yes	Yes	Yes

OHM = Operational Herbicide Monitoring.
USSM = Unified System of Silviculture Monitoring.
TRENDS = Treatment Regime Evaluation—Numerical Decision Support.
PROBE = Protocol for Operational Brushing Evaluations.
RVMM = Regional Vegetation Management Model.
EXPLORE = Experimental design Protocol for Long-term Operational Response Evaluations.
* Seedling assessments are done on 100 trees distributed over a 1.21 ha (10-m grid) plot.
† Seedling assessments are done on 36 trees distributed over a 0.49 ha plot.

Understanding the short-term impacts of silviculture practices on plant species diversity is essential for developing management strategies to maintain natural diversity, but permanent plots are also essential for understanding long-term growth and yield responses to silvicultural treatments for refining prediction models and decision-support systems.

A single standardized protocol is needed as a basis for acquiring data on stand dynamics, growth and yield, crop tree response, and vegetation community response following silvicultural treatments. A provincial protocol for long-term experiments in silviculturally treated areas will allow the pooling and sharing of data across the province and development of a comprehensive database on treatment and stand growth responses. A standardized protocol should provide short-term as well as long-term

response information on operational silviculture treatments (e.g., vegetation and mixedwood management). Establishment of long-term research experiments in operationally treated areas (i.e., Operational Experiments) will also provide information on the stand-level impacts of silvicultural practices.

4 HISTORY OF DEVELOPMENT

Five years ago, Comeau et al. (1993) initiated development of a standardized provincial protocol to acquire information on long-term growth and yield and to document short-term effects of vegetation management treatments and mixedwood management strategies on crop tree performance and non-crop vegetation species in various biogeoclimatic subzones. To acquire long-term stand-level data, the protocol included key elements from the protocol for growth and yield installations (B.C. Ministry of Forests 1992). The Experimental design Protocol for Long-term Operational Response Evaluations (EXPLORE), described here, also incorporates results of a workshop held November 15, 1995, in Richmond, B.C. The development of this protocol involved staff from Forest Practices Branch, Research Branch, Resources Inventory Branch, the six Forest Regions (Forest Resources Practices), and the NIVMA Co-operative.

5 SPECIFIC OBJECTIVES OF EXPLORE

The primary purpose of EXPLORE is to provide a standard methodology for establishing operational experiments in silviculturally treated areas. The operational experiments designed using EXPLORE methodology provide both short-term and long-term information on the effects of silvicultural treatments (including site preparation and vegetation, mixedwood, and broadleaf management) on stand performance (survival, free-growing status, growth, and yield) and on the characteristics (composition and structure) of plant communities. The protocol also provides a comprehensive approach for addressing growth and yield and vegetation management issues associated with alternative silvicultural systems. Pre-harvest data will be used to interpret early successional vegetation development following harvesting, and site preparation and rehabilitation treatments. In addition, the data will provide a detailed, yet comprehensive, database enabling descriptive and explanatory modelling of crop responses to harvesting, site preparation, planting, vegetation management, and stand tending.

6 EXPERIMENTAL DESIGN

The approach followed by EXPLORE requires at least one pair of plots (one treated plot for each treatment and one untreated control or legacy

plot) in each installation. If site conditions permit, additional plots can be established to accommodate more treatments and to make further comparisons. Treatments must be randomly assigned to the plots. The minimum two-plot (one pair) approach permits use of routine statistical procedures to make comparisons between treated and untreated (control) plots or among treatments that will enable us to better anticipate the effects of our decisions. Monitoring pairs of plots in the same opening (with the same site history) will increase the likelihood of plots being ecologically similar. This permits demonstration of treatment effects and improves our ability to detect differences between the treated and untreated units. We intend to establish at least five separate installations for each commonly used site preparation and vegetation management silviculture prescription over each major site association where the treatment will be used during the next 10 years. Installations will also be established in areas where mixedwood regeneration and management is prioritized in silviculture prescriptions under the Forest Practices Code.

6.1 Site Selection

Priority for installation location will be established by a steering committee composed of regional and branch (research and forest practices) staff from the B.C. Ministry of Forests and from industry. Candidate sites should be at least 2 ha to accommodate at least one treated and one untreated control or legacy plot. Where more than one silvicultural treatment is applied at a single site, additional plots will be required. Table 2 describes criteria for selecting comparable treatment and control plots for an **EXPLORE** installation.

TABLE 2 *Criteria for selecting comparable plot pairs for EXPLORE installations*

Characteristics	Similarity Criteria
Site history	Silvicultural history of all plots (harvesting, site preparation, stock type, stand establishment treatments, etc., before application of any treatment effect)
Timber type	Tree species composition
Mesoslope position	Class (crest, upper slope, middle slope, lower slope, toe, flat, depression)
Slope	±10%
Aspect	±45°
Elevation	±50 m
Soil texture	Broad class (fragmental, sandy-skeletal, clayey-skeletal, sandy, clayey, loamy)
Soil moisture regime	Class (xeric, subxeric, submesic, mesic, subhygric)
Site series	Variant
Vegetation complex	Vegetation species composition

6.2 Installation Layout

Sites should be viewed and preliminary plot layout completed before the stand is harvested (i.e., after the silviculture prescription is prepared or before harvesting begins). This timing will provide data on site characteristics or indicators and on stand structure needed to interpret early successional trends after harvesting. Installations can also be established after harvesting to quantify the benefits of various silvicultural treatments. However, plot layout must be completed before treatment to allow for pre-treatment measurements of crop seedlings or trees and non-crop vegetation. Application of the similarity criteria (Table 2) will ensure reasonable uniformity of the plot pairs. In newly planted sites, the remainder of the plot layout should be completed in the fall or spring when crop seedlings are most visible.

Access to the installation must be described in detail. Routes and distances from an easily located and permanent starting point are recorded. Features such as road crossings, river or creek crossing, or bridges are noted to describe the access route to the tie point. The tie point should be a permanent topographic feature (road crossing a creek, creek junction, bend in the road) distinguishable on air photos and on the ground. The objective is to ensure that the tie point can be permanently located on the ground, appropriate aerial photo, and forest cover map. To mark the tie point, select a nearby tree or pressure-treated fence post and mark it with an aluminum tag containing EXPLORE identification (e.g., T.P. EXPLORE I.D), azimuth (e.g., @ 170°) and horizontal distance (e.g., 200 m) to a treatment or untreated control plot. Do not use trees that may be harvested or felled, as this will result in loss of the permanent tie point marker.

6.3 Treatment Units

Each EXPLORE installation consists of at least two 70 × 70 m (0.49 ha) treatment units, where one is an untreated control and the other is treated (Figure 1). This is viewed as a minimum size (0.49 ha) for each treatment unit. If site conditions permit, larger plots should be established and a protection buffer of about 30 m maintained between plot boundaries and block boundaries, roads, etc. The four corners of each treatment unit are permanently marked using metal rebar, 1 m long, set at least 40 cm into the ground. To increase visibility from the air and ground, the metal rebar is covered with white plastic pipe, 2 m long, set at least 40 cm into the ground. After establishing corner posts, the boundaries of the no treatment (control) plots should be clearly marked using black-striped red or orange flagging. The location of the untreated plot must be clearly indicated to field staff and ground crews at the time of treatment application. To ensure that the treatment unit is treated in an unbiased, operational manner, the boundaries of the treatment plots should not be marked before treatment application and extra flagging should be removed after pre-treatment assessments if present in the plot. Plot information must be recorded on aluminum tags affixed to each corner post. Within each treatment unit, a nested series of measurement plots are established for collecting information on different components of the ecosystem.

6.4 Permanent Measurement Plot

One circular 0.10 ha (17.84 m radius) permanent measurement plot (PMP) is established at the centre of each treatment unit to provide a permanent fixed-area sample plot for EXPLORE measurements. The PMP provides

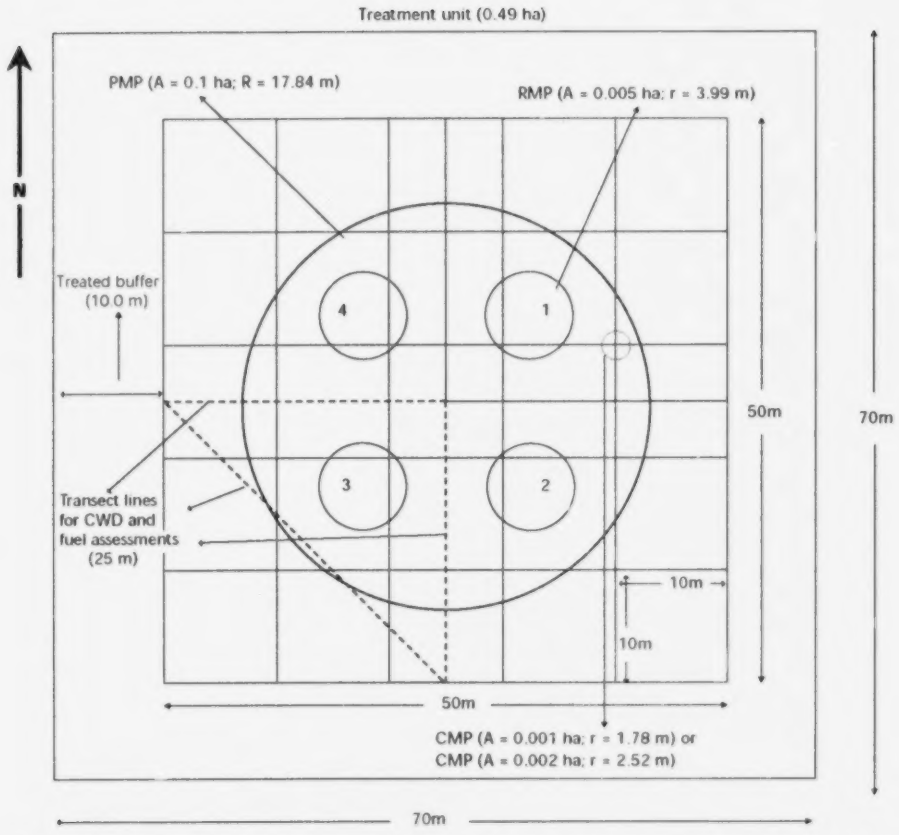

FIGURE 1 *Layout of treatment unit, measurement plots, and line transects using* ***Ex****perimental design* ***P****rotocol for* ***L****ong-term* ***O****perational* ***R****esponse* ***E****valuations (EXPLORE). CMP = competition measurement plot; PMP = permanent measurement plot; RMP = regeneration measurement plot; CWD = coarse woody debris.*

information on the effects of silviculture treatments and mixedwood management on long-term growth and yield, stand dynamics, stand structure, and stand development. In the case of a strip-cutting silvicultural system, two circular PMPs are centred on the boundaries between cut and uncut strips (one on each boundary) to document both treatment and edge effects. In the case of a dense coniferous or mixedwood stand, smaller PMPs ≥0.04 ha (≥11.28 m radius) are established for tree measurements. In the case of aerial treatment (herbicide or fertilizer) application, a protection buffer of 30 m should be maintained around untreated control plots and non-herbicide (manual cutting) or non-fertilizer plots that may be present in the installation.

The centre of the PMP is located at the point of intersection of diagonal lines connecting treatment unit corners. This point is marked using a piece of aluminum tubing (conduit), 100 cm long, driven at least 40 cm into the ground. If site conditions make it impossible or inappropriate to drive the conduit into the ground, it should be placed as close as possible to the plot centre. The distance and bearing from the conduit to the plot centre should be recorded accurately on the plot information form. An

aluminum tag detailing plot information is attached to the centre conduit. A second 50-cm-long piece of metal rebar is driven completely into the ground 50 cm north of the centre stake to permit relocation of the plot centre with a metal detector if the centre stake is disturbed. The perimeter of the PMP is marked at N, NE, E, SE, S, SW, W, and NW with cedar stakes (2″ × 2″ × 24″) painted yellow at the top or angle aluminum stakes (1¼″ × 1¼″ × 3/16″ × 24″) with a hole at the top for a metal tag.

6.5 Regeneration Measurement Plot

The PMP is subdivided into four equal quadrants to facilitate accurate stocking measurements and to better cover the entire PMP. Four circular 0.005 ha (3.99 m radius) regeneration measurement plots (RMPs) nested within each quadrant of the PMP are used to assess minimum and target stocking of preferred and acceptable species, free-growing status of crop tree species (Forest Practices Code of British Columbia 1995a), and plant species diversity (Habitat Monitoring Committee 1996). Crop and non-crop species are assigned according to the silviculture prescription for the opening. In the case of mixedwood stands, local mixedwood stocking standard guidelines should be used (B.C. Ministry of Forests 1996; Kabzems 1997). If the guidelines are not available it is appropriate to discuss the situation with researchers and specialists in the regional or branch office.

Centre points of the RMPs are located 10.5 m from the centre of the PMP (0.1 ha) at bearings of 45°, 135°, 225°, and 315°. The centre of each RMP is marked with a 100-cm-long piece of conduit with a hole at the top, driven into the ground at least 40 cm. If needed, the perimeter of the 3.99 m radius RMP can be flagged temporarily at the time of measurement.

6.6 Competition Measurement Plot

The competitive effects of neighbouring vegetation on tree performance are assessed in 36 tree-centred competition measurement plots (CMPs). Within each treatment unit, 36 crop trees are selected by establishing a 50-m grid at the centre of the treatment unit. The first gridpoint is located at an appropriate place, based on plot orientation and the size of the treatment unit (taking into account the 10 m buffer). This grid point is used as the start of the first gridline (Figure 1). Six gridlines are located at 10 m spacing. Gridpoints are marked with angle aluminum stakes. For each species of interest, the tree closest to each gridpoint is selected as the centre of a CMP. However, if there is an unharvested control or plots are established pre-harvest, then CMPs are centred on gridpoints. The sizes of the CMPs are: (a) 0.001 ha (1.78 m radius) if the crop tree or vegetation is $\leq$ 2 m high; and (b) 0.002 ha (2.52 m radius) if the crop seedling or vegetation is >2 m high. Crop tree (diameter, height, crown attributes, etc.) and non-crop vegetation species (modal height, percent cover, distance from crop tree, etc.) are assessed in this plot. For non-crop vegetation species, five main species interacting with the crop tree are selected for assessment.

6.7 Soil Disturbance Assessment Line Transects

Various mechanical site preparation (MSP) techniques (scalping, mixing, inverting) may be applied to achieve site-specific silviculture objectives, such as reduction of unwanted vegetation or exposure of mineral soil. To measure the type and degree or severity of soil disturbance created by MSP equipment, transect lines are spaced at 5 m on a 50-m grid in a treatment unit. Standardized methodology described in the *Soil Conservation*

Surveys Guidebook (Forest Practices Code of British Columbia 1997) is used to measure soil disturbance.

6.8 Coarse Woody Debris and Fuel Assessment Line Transects

Coarse woody debris (CWD), large dead woody material in various stages of decomposition, is a major contributor to the nutrient pool and structural diversity in forests, and provides habitat for plants and other organisms. The amount of CWD in each treatment unit is measured along two transect lines. From the PMP centre, a direction for the first 25-m transect is randomly selected. A second 25-m transect at plus 90° from the first is marked. All CWD with a diameter greater than 7.5 cm are tallied along the transects.

The practice of using regulated fires to reduce or eliminate low vegetation or the unincorporated organic matter of the forest floor is called prescribed fire or slashburning. This treatment is applied to meet site-specific management objectives, including site preparation for forest regeneration. To provide information on the amount of slash load and the intensity of the burn, pre- and post-burn conditions are assessed according to procedures defined by Trowbridge et al. (1986). The two transect lines described for CWD measurements are used, and a third line is established between the endpoints of the CWD transects to create a triangular area for assessing pre- and post-burn fuel conditions.

6.9 Tree Tagging

Within the seedlings or trees that require repeated measurements are marked with numbered aluminum tags attached with coated solid-core copper wire or coated electrical wire. Tags should be attached loosely so as not to restrict diameter growth of young seedlings. When trees exceed 5 cm diameter at breast height (dbh), staple plastic "ties" to each tree with a stapler. Slide the plastic numbered tags onto the tie so that the clip holds it and staple the other end to the tree. Tags should be installed 10 cm below dbh and the trees painted with white loggers' paint at 1.3 m (breast height). To simplify tagging and to reduce the number of tagging errors, use plant rows or divide the PMP into eight sectors. In young plantations, use planting rows and start tagging from the north-east side of the plot. In naturally regenerated areas where tagging in rows is not possible, divide the PMP into eight sectors. Once the sectors are estimated, start tagging in the sector at the north-east side of the PMP (Sector 1). Complete tagging in Sector 1 before proceeding to Sector 2. Note the approximate location of each seedling on the plot map.

7 MEASUREMENTS

Ideally, measurements should start before harvesting of the stand (FORM 1, Appendix 1). Pre-harvest data can be used, for example, to interpret vegetation succession or early vegetation development following harvesting and site preparation. However, monitoring can also begin immediately before application of site preparation, brushing, spacing, or other treatments. Pre-treatment measurements are essential to determine pre-treatment variation in crop trees and non-crop vegetation, and must be made before any silviculture treatment is applied. Measurements should

be taken as close to the treatment date or time as possible to quantify response and relate treatment effect to vegetation phenology and condition at the time of treatment application. Re-measurements of crop trees and assessments of vegetation are performed in year 1, 2 (optional, i.e., site preparation), 3, 5, 10, and 15 years after treatment, and at 10-year intervals thereafter.

7.1 Site and Soil Description

Site and soils are described to facilitate examination of the various stages of plant community development following manipulation, and to determine the site classification according to the Biogeoclimatic Ecosystem Classification (BEC) system (Meidinger and Pojar 1991). Site and soil assessments are completed at the time of installation establishment to provide information on key attributes (Table 3). The Site and Soil Assessment Form (FORM-2) must be used to record the data (Appendix 2). To collect soils data, dig a soil pit 50 × 50 cm and 1 m deep in each PMP. The site description forms need not be filled out again during subsequent measurements unless parameters are modified (e.g., moisture regime or surface substrate is modified by mechanical site preparation).

7.2 Stand Description

To provide data on stand development, stand structure, and species composition information is collected at the time of installation establishment (Table 4). Collection of these data must be repeated post-harvest in the case of partial cutting (seed tree, shelterwood, selection, and clearcutting

TABLE 3 *Summary of site and soil data collected for EXPLORE installations*

Parameters	Data	Plot
Site features		
Surface shape: concave, convex, or straight	X	PMP
Mesoslope: crest, slope (upper, middle, or lower), toe, depression, or flat	X	PMP
Parent material	X	PMP
Slope failure	X	PMP
Gullies	X	PMP
Flood hazard: frequent, occasional, rare, or other	X	PMP
Soil features		
Soil depth, soil colour	X	PMP
Humus form: group, modifier, and thickness	X	PMP
Moisture regime	X	PMP
Nutrient regime	X	PMP
Soil description		
Horizon, depth, texture	X	PMP
Coarse fragments %: total, gravel, cobbles, and stones	X	PMP

TABLE 4 *Summary of coniferous and deciduous tree measurements collected for EXPLORE installations*

Parameters	Tree height ≤2.0 m		Tree height >2.0–≤20.0 m		Tree height >20.0 m (pre-harvest)	
	Data	Plot	Data	Plot	Data	Plot
Origin: planted, advance, new natural	X	RMP	X	PMP		
Age	X	RMP	X	PMP	X	PMP
Total height (cm)	X	RMP	X	PMP	X	PMP
Leader length (cm)	X	RMP				
Root collar diameter (mm)*	X	RMP				
Diameter at breast height (cm)†	X	RMP	X	PMP	X	PMP
Crown width (E-W) and (N-S) (cm)	X	RMP	X	PMP		
Height to the crown base (cm)	X	RMP	X	PMP	X	PMP
Tree vigour	X	RMP	X	PMP		
Condition (foliage, leader, stem)	X	RMP	X	PMP		
Damage cause	X	RMP	X	PMP		
Total density of conifers and broadleaves	X	RMP	X	PMP	X	PMP
Density of each species	X	RMP	X	PMP	X	PMP
Number of stems/stump (deciduous only)	X	RMP	X	PMP		
Number of well-spaced trees	X	RMP				
Number of free-growing trees	X	RMP				

* If height is ≤ 2.0 m.
† If height is ≥ 1.3 m.

with reserves). If the installation is established after harvesting, the stand must be described at that time. All trees >7.5 cm dbh (for stand description only) are numbered clockwise (start from north side of quadrant 1 in PMP), painted with white loggers' paint at 1.3 m (for repeated measurements) and measured for dbh, height to crown base, vigour, forest health or pathological indicators, and damage, as described in Table 4. Total height of the numbered trees is also estimated. In dense coniferous or mixedwood stands 0.005 ha (3.99 m radius) RMPs can be used during pre-treatment measurements. The Tree Measurements Form (FORM-3) must be used to record the data (Appendix 3).

7.3 Tree Measurements

All coniferous and deciduous trees in the PMP that are taller than 2 m are measured as described in Table 4. In case of dense coniferous or mixedwood stands, 0.005 ha (3.99 m radius) RMPs can be used during measurements as described in Section 7.2. However, it is extremely important that a minimum of 50 trees are tagged in all four RMPs, otherwise use the PMP. If it is desired to obtain a detailed tally of trees smaller than 2 m and these are abundant, a plot between 0.01 ha (5.64 m radius) and 0.1 ha (17.84 m radius) may be used. For this purpose, plot size should be selected so that approximately 100 trees are sampled. The Tree Measurement Form (FORM-3) must be used to record tree data (Appendix 3).

7.4 Regeneration Measurements

In each RMP, the total density of preferred and acceptable tree species, as well as the number of well-spaced and free-growing or well-growing (in mixedwood stands) trees are determined on the basis of Regional Stocking

Standards Guidebooks (Forest Practices Code of British Columbia 1995) (Table 4). The Regeneration Performance Assessment Form (FORM-4) is used to record regeneration data (Appendix 4).

7.5 Non-crop Vegetation Species and Habitat Monitoring

In each RMP, the presence, cover, height, density (trees only), and distribution of all vascular and non-vascular plant species are recorded to provide information on community composition and structure (Table 5). Vegetation assessments must be completed when vegetation is fully developed (mid-summer). There should be no destructive sampling within the PMP. The Vegetation Measurement Form (FORM-5) must be used to record non-crop vegetation percent cover, modal height, and distribution data (Appendix 5).

7.6 Competition Measurements

The competitive effect of neighbouring main plant species (modal height, percent cover, and distance) on crop tree growth is assessed in CMPs (Table 5). For non-crop hardwood species, crown attributes and average diameter of each species is also recorded. Mean crop tree height is used to determine CMP size and the same plot size is used for all 36 sample trees

TABLE 5 *Summary of non-crop vegetation measurements collected for EXPLORE installations*

Parameters	Data	Plot
Vascular plant species		
Species list (tall shrubs, low shrubs, herbs)	X	RMP
Total percent cover	X	RMP and CMP
Percent cover by species	X	RMP
Percent cover for target species (5 major species)	X	CMP
Species modal height (cm)	X	RMP and CMP
Species average distance (cm)	X	CMP
Species distribution	X	RMP and CMP
Non-vascular plant species		
Total percent cover	X	RMP
Identify the genus (if % cover of a genus >5%)	X	RMP
Modal height (cm) (if % cover of a genus >5%)	X	RMP
Species distribution	X	RMP
Non-crop hardwoods		
Species modal height (cm)	X	RMP and CMP
Species percent cover	X	RMP and CMP
Average root collar diameter (mm)*	X	RMP and CMP
Average diameter at breast height (cm)†	X	RMP and CMP
Crown width (E-W and N-S) (cm)	X	RMP and CMP
Density of each species (number of plants/plot)	X	RMP and CMP
Number of stems/stump	X	RMP and CMP

* If height is ≤ 2.0 m.
† If height is ≥ 1.3 m.
NOTE: If hardwood tree height is >20.0 m, measurements are made in RMP only.

during a measurement period. Based on percent cover, five main vegetation species interacting with a crop tree are selected for vegetation assessments. The Competition Measurement Form (FORM-6) must be used to record CMP data (Appendix 6).

7.7 Site Index Measurements (Optional)

Site index is a measure of site growth potential and is defined as the average height of the top height trees of certain species at a reference age of 50 years breast height age. To determine site index of a stand, various methods can be used: biogeoclimatic method; growth intercept method; and site index curve method. Each of these methods can be used based on stand age and condition, and desired accuracy (B.C. Ministry of Forests 1995). To determine site index of a species of interest using one of the above methods, the height and age of sample trees are measured

TABLE 6 *Site-specific optional measurements taken for EXPLORE installations*

Parameters	Data	Plot or Transect Line
Site index measurements		
Species	X	PMP
Diameter at breast height (cm)	X	PMP
Height (m)	X	Sample trees
Age	X	Sample trees
Coarse woody debris assessments		
Species	X	25 m transects
Bole Length (m)	X	25 m transects
Diameter (cm)	X	25 m transects
Tilt angle	X	25 m transects
Decay code	X	25 m transects
Length (m) of accumulated pieces	X	25 m transects
Depth (m) of accumulated pieces	X	25 m transects
Prescribed fire assessments		
Species intersecting transect line (if diameter >7 cm)	X	25 m transects
Diameter (if >7 cm) of species intersecting transect line	X	25 m transects
% species composition intersecting transect line (if diameter ≤7 cm)	X	25 m transects
Number of pieces in each class (if diameter ≤7 cm)	X	25 m transects
Depth of mosses and litter (cm)	X	25 m transects
Depth of burn (cm)	X	25 m transects
Depth of duff (cm)	X	25 m transects
% of mineral exposure	X	25 m transects
Soil disturbance assessments		
Trail type: excavated or bladed; dispersed (repeated machine traffic)	X	50 m transects
Gouge type: deep, wide, long	X	50 m transects
Scalp type: very wide, wide, continuous	X	50 m transects
Light measurements		
PPFD above canopy	X	CMP
PPFD top of crop seedling	X	CMP
PPFD middle of crop seedling	X	CMP
PPFD base of crop seedling	X	CMP

(Table 6). To measure tree height and age, 4–10 top height trees are selected in each PMP for measurement. To be selected as a top height tree, trees must meet the criteria described by Soderberg and Nigh (1994), and Nigh et al. (1997): the largest diameter; dominants and codominants; undamaged; unsuppressed; alive; good vigour; and can be accurately measured for breast height age. Following height measurement, an increment core is taken to determine tree age. Increment cores must be taken at 1.3 m height for determination of breast height age. If the total age of the tree is required, it can be determined by taking increment cores at ground level or by adding a number of years to breast height age. The Site Index Form (FORM-7) must be used to record the data for sample trees (Appendix 7). Additional data on biogeoclimatic zone, subzone, and site series are recorded in the Site Description and Soils Assessment Form (FORM-2), and mensuration data on trees are recorded in the Tree Measurement Form (FORM-3).

7.8 Coarse Woody Debris Assessments (Optional)

Detailed measurements of all coarse woody debris >7.5 cm (species, bole length, diameter, tilt angle, decay, and length and depth of accumulated pieces) are tallied on both 25 m transects, if the installation is established pre-harvest (Table 6). The Coarse Woody Debris Assessments Form (FORM-8) must be used to record the data (Appendix 8).

7.9 Prescribed Fire Assessments (Optional)

Before and after the prescribed fire, detailed measurements of type and distribution of fuels or slash (species, diameter, percent species composition, number of pieces, depth of mosses and litter, depth of burn, depth of duff, and percentage of mineral exposure) are tallied on three 25 m transect lines (Table 6). The Fuel Assessment Form (FORM-9) must be used to record prescribed fire data (Appendix 9).

7.10 Site Disturbance Assessments (Optional)

The amount of site disturbance in each disturbance type (trail, gouge, and scalp) is assessed on each transect (Table 6). Disturbance is measured according to the *Soil Conservation Surveys Guidebook* (Forest Practices Code of British Columbia 1997). The Site Disturbance Form (FORM-10) is used to record soil disturbance data (Appendix 10).

7.11 Light Measurements (Optional)

Light measurements provide a useful, objective, and quantitative index of competition by overtopping vegetation. Photosynthetic photon flux density (PPFD) (the amount of light reaching a point in the 400 to 700 nm wavelengths that are used by plants) can be measured using a variety of techniques. Where overtopping vegetation is shorter than 2 m, an 80 cm AccuPAR (Decagon Devices Inc. 1996) or 40 or 80 cm Sunfleck Ceptometer (Decagon Devices Inc. 1991) may be used to measure the fraction of full sunlight reaching the top of the crop seedlings in each CMP. A measurement is taken above the vegetation canopy, and another at the top of the conifer seedling, and the ratio of the two readings is calculated. Where the vegetation is shorter than 2 m, AccuPAR or Ceptometer measurements may be taken on sunny or overcast days (Table 5). The Light Measurement Form (FORM-11) must be used to record PPFD data (Appendix 11).

When the overtopping vegetation is taller than 2 m or is dominated by broadleaf tree species, it is important that AccuPAR or Ceptometer measurements are taken only when the sky is overcast. Taking measurements

on a sunny day under a tall canopy can give an inaccurate estimate of understorey light conditions due to penetration of direct sunlight through gaps. If measurements must be made on clear or variable days, measurements at each point should be taken at three times during the day (08:30–10:30; 11:00–14:00; and 14:00–16:00), and averaged. Individual quantum sensors may also be used and light readings taken over a 60 second or longer period. If available, Li-Cor LAI-2000 Plant Canopy Analyzer (PCA) instrumentation (Li-Cor Inc., 1991) or fish-eye photographs may also be used to measure fractional transmittance reaching seedlings, and to fully characterize understorey light conditions associated with different levels of canopy retention. Measurements should be taken at each of the 36 gridpoints using a Li-Cor LAI-2000 PCA instrument, AccuPAR/Ceptometer instrumentation (as described above), or fish-eye photographs. If using PCA instrumentation, we recommend using a view restrictor to limit the view of the sensor to 90° and collecting measurements in each cardinal direction (north, south, east, and west).

To characterize responses of understorey vegetation to light conditions, fish-eye photographs or PCA measurements may be taken at the centre of each 3.99 m radius RMP. If quantum sensors are being installed to record diurnal and seasonal patterns in understorey light, it is recommended that these be installed in the centre of each RMP.

8 RECORDS

For silviculture to be effective as a management tool, good records are essential. Mandatory and optional forms for each installation are listed in Table 7.

9 PHOTOGRAPHS

Photographs are taken in each installation when tree, soil disturbance, non-crop vegetation, coarse woody debris, and prescribed fire measurements or assessments are made, and at the time of treatment applications. Colour 35 mm slide film is used and the slides properly labelled (installation number, treatment type, description of subject, date photograph taken). Photographs should be taken from the PMP plot centre in the direction of each RMP centre.

10 INSTALLATION MAINTENANCE

Maintenance of the installations will be performed when each measurement is made. Changes in access and errors in the access notes must be corrected at re-measurement. Missing corner posts, markers, centre stakes, and seedling tags are replaced (Appendix 12). EXPLORE installation information must be recorded and noted within district opening files. The

TABLE 7 *Forms for recording data for EXPLORE installations*

Form no.	Form description	Plot size	Time or year	Appendix
Mandatory				
FORM-1	Installation Administration and Site History Description Form	Treatment unit	Installation establishment; update when any silviculture treatment is applied	1
FORM-2	Site Description and Soil Assessment Form	Treatment unit	Installation establishment	2
FORM-3	Tree Measurements Form	RMP, PMP or treatment unit	Installation establishment, 0, 1, 2 (site prep only), 3, 5, 7, 10, 15 and every 10 years thereafter	3
FORM-4	Regeneration Performance Assessments	RMP	0, 1, 2 (site prep only), 3, 5, 7, 10, 15	4
FORM-5	Vegetation Measurements Form	RMP	0, 1, 2 (site prep only), 3, 5, 7, 10, 15	5
FORM-6	Competition Measurements Form	CMP	0, 1, 2 (site prep only), 3, 5, 7, 10, 15	6
Optional				
FORM-7	Site Index Measurements Form	PMP	Pre- (installation establishment) or post-harvest	7
FORM-8	Coarse Woody Debris Assessments Form	25 m transects	Installation establishment	8
FORM-9	Prescribed Fire Fuel Assessments Form	25 m transects	Pre- and post-burn treatment	9
FORM-10	Site Disturbance Assessments Form	50 m transects	After site preparation treatment	10
FORM-11	Light Measurements Form	CMP	0, 1, 2 (site prep only), 3, 5, 7, 10, 15	11

location of each EXPLORE installation and tie point must be recorded on an appropriate Forest Cover map (minimum scale of 1:20 000). To protect EXPLORE installations from future unwanted treatments, installation maps must be prepared and a map reserve maintained for each installation. The map notation must be permanently included on the Forest Cover mylar in the Forest District office. Signs must be installed describing the treatment type and providing installation information. If the stand is not free-growing after 15 years and requires stand tending or if there are forest health concerns, future treatments to ensure early stand establishment or enhancement must be applied uniformly.

11 DATA ANALYSIS

Analysis of Variance (ANOVA) will be performed to compare treatment effects using data from a number of sites (treatments replicated in time and space). The data are analyzed as an incomplete block design, since each block will contain different numbers of treatments (Table 8). Means

TABLE 8 *Analysis of variance for a partially balanced incomplete block design*

Source of variation	Degrees of freedom (df)	Sum of Squares	Mean Square	*F*-test
Treatments (t)	t–1	SST	SST/(t–1)	MST/MSE
Blocks (b)	b–1	SSB	SSB/(b–1)	MSB/MSE
Error (e)	n–b–t+1	SSE	SSE/(n–t–b+1)	
Total (n)	n–1	Total SS		

will be summarized for each installation treatment. Statistical comparisons between pairs of treated and untreated units in the same installation are not possible due to lack of replication. Analysis of repeated measures will be performed to analyze the effects of treatments and time (treatment × time interaction). Continuous variables (e.g., tree height, tree diameter, vegetation cover) repeatedly measured more than three times will be analyzed using the response curve approach. Regression analysis will be used to examine relationships between crop tree performance variables and competition indices or vegetation abundance. Categorical variables (e.g., vigour, stem condition, foliage condition) will be summarized in multiway contingency tables with cells defined by treatment. Binary variables (e.g., tree—dead or alive; soil disturbance—present or absent) will be analyzed using logistic regression. Results from these **EXPLORE** installations will be summarized in progress reports, working papers, and extension notes, which will be sent to the appropriate contacts in Regional and District Offices.

12 QUALIFICATIONS FOR QUALITY ASSURANCE

To ensure quality control and integrity of the data collected in **EXPLORE** installations, the person responsible for managing the crew in the field must be experienced in ecosystem classification, vegetation species identification, soils description, regeneration performance surveys, site index measurements, coarse woody debris assessments, site disturbance measurements, and research plot layout. Crew supervisors should have a minimum of three years of forestry experience or education in a forestry-related field (e.g., **BSF** or **BSc**), and complete required training courses before performing the work.

13 INSTALLATION FIELD WORK REQUIREMENTS

Ten to fourteen days are required for establishment of an installation (Table 9).

The time required depends on stand age, site and weather conditions, and travel time. Use of local contractors will reduce travel costs and should be encouraged. The estimates shown in Table 9 are based on a two-person crew, including the crew supervisor.

TABLE 9 *Estimate of crew-day requirements for each EXPLORE installation*

Activity	Required Forms	Crew-days (10 hour/day)
Site selection		1
Plot layout (boundaries, subplot, posts, flagging, centre rebar, flagging, tagging, etc.)		1
Pre-harvest measurements (site description, stand description)	FORM-1, FORM-2, and FORM-3	2
Pre-treatment measurements (crop trees and non-crop vegetation)	FORM-3, FORM-5, and FORM-6	2
Post-treatment summer measurements (non-crop vegetation)	FORM-1, FORM-5, and FORM-6	1.5
Post-treatment fall measurements (crop trees)	FORM-1, FORM-3, and FORM-4	1.5
Optional Activities		
Site Index	FORM-3 and FORM-7	1
Coarse woody debris description (pre-harvest)	FORM-3 and FORM-8	1
Fuel assessments (pre-fire and post-fire)	FORM-1 and FORM-9	2
Site disturbance assessments (after site preparation)	FORM-1, FORM-2, and FORM-10	1
Light measurements	FORM-11	1
Total number of crew-days		**14**

14 EXPLORE BENEFITS

EXPLORE provides a basic experimental approach for obtaining needed information on the effects of silviculture practices on stand dynamics, growth and yield, and biodiversity. The network of installations established according to this protocol will provide information on (a) the short-term and long-term impacts of silviculture practices, including vegetation and mixedwood management; (b) the impact of silviculture practices on crop growth and yield, and biodiversity; and (c) the impact of alternative silvicultural systems on forest regeneration and community diversity. In addition, **EXPLORE** will provide data useful in developing integrated vegetation, mixedwood, or broadleaf management decision-support systems. **EXPLORE** installations will serve as demonstration sites for training, communication, planning, and decision-making. Treatment response evaluations with **EXPLORE** installations will allow forest managers to provide support for their actions and meet the specified goals in the Forest Practices Code of British Columbia.

To ensure consistency and sharing of the data across the province, there is a need for provincial co-ordination and development of a comprehensive provincial database.

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APPENDIX 1

Installation Administration (FORM-1)

INSTALLATION ADMINISTRATION (FORM-1)

1. Administration No.
Forest Cover Map | Opening No. | Block | Installation No.

2. Site Name

3. PMP No.

4. Region/Dist.

5. Licensee

6. Licence No.

7. C.P.

8. Timber Mark

9. UTM Co-ord's Zone NAD
N
E

10. Elevation (m)

11. Expos.

12. Management Objectives 1 2 3

14. Inventory Label

15. Installation Established y m d

16. Initials of Recorders

17. Contractor

13. REFERENCE TREE DATA

Species	DSH (cm)	Dist. (m)	Azimuth
	.	.	
	.	.	
	.	.	
	.	.	

18. Installation Objectives

19. Location (POC descrip. & Dist./Azimuth from POC):

20. HARVESTING/DISTURBANCE HISTORY	Ref. No.	21. Harvest Commenced	Harvest Completed	22. Broad Meth.	23. Type of Harvest	24. Skidder Type	25. Silviculture System
Notes:	1	y m d	y m d				
	2	y m d	y m d				
	3	y m d	y m d				

20. SITE PREPARATION HISTORY	Ref. No.	21. Completion date	26. Tech.	27. Method	28. Type	29. kg ai or ae per ha	30. L/ha ml/frill	31. Notch Space
Notes:	1	y m d				.		
	2	y m d				.		
	3	y m d				.		

32. STOCKING STANDARDS "A" (SILVICULTURE PRESCRIPTION)

Reference Number	Min. Spac.	Target sph	Minimum sph	Preferred Species 1	Preferred Species 2	Preferred Species 3	Preferred Species 4	Acceptable Species 5	Acceptable Species 6	Acceptable Species 7	Acceptable Species 8
1	.										
2	.										
3	.										

33. STOCKING STANDARDS "B" (SILVICULTURE PRESCRIPTION)

Reference Number	Regen. Delay	Early Assess.	Late Assess.	Minimum Height by Species (cm)	% Above Brush
1					
2					
3					

ARTIFICIAL REGENERATION HISTORY AND SOURCE

Reference Number	21. Planting Completion Date	34. Tech.	35. Regeneration Method	36. Stock Type Species	Type	Size	Age	37. Seedlot	38. Nurs.
1	y m d								
2	y m d								
3	y m d								

20. STAND TENDING HISTORY	Ref. No.	21. Tending comp. date	39. Base	40. Tech.	41. Method	42. Type	29. kg ai or ae per ha	30. L sol'n/ha	31.Notch Space
Notes:	1	y m d					.		
	2	y m d					.		
	3	y m d					.		
	4	y m d					.		
	5	y m d					.		
	6	y m d					.		

Instructions for Completing Installation Administration (FORM-1)

Element Name: Administration Number	**Form: 1**	**Cell Reference: 3**
Code Definition	**Acceptable Codes**	
Record the Forest Cover Map sheet number, the opening number, the Block and the Installation number.	Forest cover map sheet number Opening no. 001 - 999 Block: cutblock number Installation no. 001 - 999	
Field Type: Number	Justification: Right	
Sampling Standard: n/a	Example entry: 093J081 022 003 001	

Element Name: Site Name	**Form: 1**	**Cell Reference: 2**
Use the colloquial name for the site, using standard abbreviations for creeks, rivers, or lakes.		
Field Type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: Soards Creek	S O A R D S C R K

Element Name: PMP Number	**Form: 1**	**Cell Reference: 3**
Code Definition	**Acceptable Codes**	
Enter the plot number in the installation	Whole number > 0	
Field type: Numeric.	Justification: n/a	
Sampling Standard: n/a	Example entry: Plot 1	1

Element Name: Forest Region	**Form: 1**	**Cell Reference: 4**
Code Definition	**Acceptable Codes**	
Cariboo	CA	
Kamloops	KA	
Nelson	NE	
Prince George	PG	
Prince Rupert	PR	
Vancouver	VA	

Element Name: Forest District		Form: 1	Cell Reference: 4
Code Definition	**Acceptable Codes**	**Code Definition**	**Acceptable Codes**
Arrow	AR	Mid-coast	MC
Boundary	BO	Merritt	ME
Bulkley	BU	100 Mile House	MH
Cassiar	CA	Mackenzie	MK
Cranbrook	CB	Morice	MO
Chilcotin	CH	North Coast	NC
Chilliwack	CK	Penticton	PE
Clearwater	CL	Prince George	PG
Campbell River	CR	Port McNeill	PM
Dawson Creek	DC	Queen Charlotte Islands	QC
Fort Nelson	FN	Quesnel	QU
Horsefly	HO	Revelstoke	RE
Invermere	IN	Robson Valley	RV
Fort St. James	JA	Salmon Arm	SA
Fort St. John	JO	South Island	SI
Kamloops	KA	Sunshine Coast	SC
Kispiox	KI	Squamish	SQ
Kootenay Lake	KL	Vanderhoof	VA
Kalum	KM	Vernon	VE
Lakes	LA	Williams Lake	WL
Lillooet	LI		
Field Type: Character		Justification: Left	
Sampling Standard: n/a		Example entry: Cariboo/ Hornefly	C A H O

Element Name: Licensee	Form: 1	Cell Reference: 5
Code Definition	**Acceptable Codes**	
Enter licensee name. If small business enter "Small Business Forest Enterprise Program."		
Field Type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: SBFEP	S B F E P

Element Name: Licence No.	Form: 1	Cell Reference: 6
Code Definition	**Acceptable Codes**	
Follow licence number format	One letter followed by 5 numbers	
Field Type: Character/Numeric	Justification: left	
Sampling Standard: n/a	Example entry: A18167	A 1 8 1 6 7

Element Name: Cutting Permit (C.P.)	Form: 1	Cell Reference: 7
Code Definition	**Acceptable Codes**	
Enter the cutting permit number.	As per Code Definition guidelines.	
Field Type: Numeric	Justification: Right	
Sampling Standard: n/a	Example entry: 203	0 2 0 3

Element Name: Timber Mark	Form: 1	Cell Reference: 8
Code Definition	**Acceptable Codes**	
Enter the original licensee timber mark	-	
Field Type: Character/Numeric	Justification: Left	
Sampling Standard: n/a	Example entry: A30908	A 3 0 9 0 8

Element Name: UTM Co-ordinates	Form: 1	Cell Reference: 9
Code Definition	**Acceptable Codes**	
Field Type: Enter the UTM co-ordinates (North and East) followed by zone and NAD (North American Datum).	Justification: Right	
Sampling Standard: n/a.		
Example: E 436, 6601 m; N 500, 5400 m; Zone 7; NAD 27	4 3 6 6 6 0 1 5 0 0 5 4 0 0 7 2 7	

Element Name: Elevation	Form: 1	Cell Reference: 10
Code Definition	**Acceptable Codes**	
Elevation in metres above sea level		
Field type: Numeric	Justification: Right	
Sampling Standard: ±50 m	Example entry: 890 m	8 9 0

Element Name: Exposure Type	Form: 1	Cell Reference: 11
Exposure type refers to atmospheric and other climate-related conditions at the site that deviate from typical (normal) climate. Conditions are considered significant if they are reflected in the soils and/or vegetation. Up to 2 exposure types can be identified (see Field Guide for descriptions). This will be used to sort data for Biogeoclimatic Phase level.		
Code Definition	**Acceptable Codes**	
Not Applicable - no significant exposure to deviating climate-related conditions is evident in soils or vegetation.	N	
Wind - site is directly influenced by strong winds, e.g., exposed mountain tops, along seashores or large lakes, areas of "wind funnelling" where valleys converge in direction of wind flow. *Soil indicators:* weak soil profile development due to scalped (eroded) profiles, evidence of soil erosion on windward side and deposition on lee side, and dunning. *Vegetation indicators:* strongly reduced height growth, gnarled growth form with treetops and branches oriented downwind, wind-shorn thickets of trees or shrubs (wind-shorn surface follows outline of an object providing wind protection).	W	
Insulation - sites directly subjected to radiant solar heating to a degree significantly greater than that on associated flat-lying ground. Generally on SE, S, and SW aspects with slopes 20%–50%. *Soil indicators:* weak soil profile reflecting drier environment (compared to normal profiles for the area), or profiles with darker surface horizons. *Vegetation indicators:* presence of heat-tolerant species, reduced tree growth, slow or sparse tree regeneration, open crown cover, and tree regeneration in distinct age groups reflecting "wetter" years.	I	
Frost - cold air accumulation in depressions and valley bottoms during conditions of high night-time surface cooling and/or cold air drainage. Frost pockets are often surrounded by slopes leading to higher elevations where cold air originates. *Soil indicators:* wet and/or organic conditions in depressions. *Vegetation indicators:* presence of species normally found in conditions colder than those of the general area, such as subalpine fir in the Interior Douglas-fir Zone; presence of frost-hardy shrubs and herbs (e.g., scrub birch, marsh cinquefoil, shrubby cinquefoil); abundance of frost cracks on tree trunks.	F	
Cold Air Drainage - areas such as mountain gullies, through which cold air passes. Often grade into frost pockets, but are distinct in that cold air does not accumulate. *Soil and vegetation indicators:* similar to frost, but the influence of cold temperatures usually not as pronounced.	C	
Salt spray - areas that receive enough marine salt spray to affect a vegetation type and growth form and soil chemistry and morphology. *Soil indicators:* high pH and conductivity, accumulation of white salt as distinct crystals, weak profile development. *Vegetation indicators:* many salt-tolerant species, slow growth of many species.	S	

Element Name: Exposure Type	Form: 1	Cell Reference: 11
Exposure type refers to atmospheric and other climate-related conditions at the site that deviate from typical (normal) climate. These deviating conditions are considered significant if they are reflected in the soils and/or vegetation. Up to 2 exposure types can be identified (see the Field Guide for descriptions). This will be used to sort data for Biogeoclimatic Phase level.		
Code Definition	**Acceptable Codes**	
Atmospheric Toxicity - e.g., where highly acidic or alkaline precipitation, or chemically toxic fumes from industrial plants affect type and growth form of vegetation, and soil chemistry and morphology. *Soil indicators:* unexpected very high or very low pH, accumulations of chemicals normally absent or present in small quantities. *Vegetation indicators:* defoliated areas, presence of diseased or dead standing species, many species tolerant of abnormal chemical accumulations.	A	
Other - e.g., localized rain shadow, snow accumulation, tidal exposure (inter-tidal area), and freshwater spray (near waterfalls and rapids).	O	
Field type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: frost	F

Element Name: Management Objectives	Form: 1	Cell Reference: 12
Identify management objectives (other than timber production) for treatment unit of installation, as specified in the SP.		
Code Definition	**Acceptable Codes**	
Forest health (including protection from insects, disease, and fire)	FH	
Wildlife	W	
Hydrology (i.e., fish habitat and water quality)	H	
Riparian management	RI	
Visual quality	V	
Recreation	RE	
Biodiversity	B	
Cultural/Heritage	C	
Range Management	RA	
Field type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: To produce an uneven-aged stand of Engelmann spruce and subalpine fir while maintaining habitat for mountain caribou.	W

Element Name: Reference Trees	Form: 1	Cell Reference: 13
To relocate installation centre. Describe location of reference trees.		
Code Definition	**Acceptable Codes**	
Species	See Cell No. 36 (Form-1)	
Diameter at stump height (DSH) (cm)	1 - 500	
Distance (m)	0 - 15	
Azimuth	0 - 360	
Field Type: species - character; rest - numeric	Justification: species - Left; rest - Right	
Sampling Standard: azimuth ± 2 degrees, distance ± 0.5 m, diameter ± 0.1 cm or 1% whichever is greater	Species:	P | l | ı
Example entry: Pine reference tree 33.5 cm diameter at stump height, distance 4.48 m to installation centre, at 126°:	Diameter at stump height	3 | 3 • 5
	Distance:	4 • 4 | 8
	Azimuth:	1 | 2 | 6

Element Name: Inventory Label	Form: 1	Cell Reference: 14
Enter inventory label from SP for that unit.		
Code Definition	**Acceptable Codes**	
Field Type: Character/Numeric	Justification: Species - Left; site index - Right.	
Sampling Standard: n/a		
Example: Fdc, Cw stand with site index 30	F | d | c | C | w | | | | | 3 | 0	

Element Name: Installation Establishment	Form: 1	Cell Reference: 15
Record date of installation establishment		
Code Definition	**Acceptable Codes**	
Year, month, day		
Field Type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: (Sept. 5, 1996)	1 | 9 | 9 | 6 | 0 | 9 | 0 | 5

Element Name: Initials of Recorders	Form: 1	Cell Reference: 16
Code Definition	**Acceptable Codes**	
Record initials of both crew members	Enter all initials, maximum 3	
Field type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: Andy P. Domit	A | P | D

Element Name: Contractor	Form: 1	Cell Reference: 17
Code Definition	**Acceptable Codes**	
Up to 8 letters of the contractor's name		
Field type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: IFS	I F S

Element Name: Installation Objectives	Form: 1	Cell Reference: 18
Record specific objectives of an installation, if not described by the Installation Type		
Code Definition	**Acceptable Codes**	
Field type: Character	Justification: n/a	
Sampling Standard: n/a	Example entry: To monitor the effects of excavator mounding on an ESSF wk1 08 site series, planted with Sw PSB 313 2+0	

Element Name: Installation Location	Form: 1	Cell Reference: 19
Record a brief but precise description of the installation location within the opening. Include the point of commencement (POC), azimuth, and distance to the installation centre. Will be used to relocate.		
Field type: Character	Justification: n/a	
Sampling Standard: n/a	Example entry: POC at NW corner of landing 7, 55 m at 315° to Installation 01	

Element Name: Activity Notes	Form: 1	Cell Reference: 20
Record specific information about the installation		
Field type: Character/Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: This block was sheep-grazed in conjunction with planting	

Element Name: Commencement/Completion Date	Form: 1	Cell Reference: 21
To identify when regeneration delay and free-growing standards will apply to the installations		
Code Definition	**Acceptable Codes**	
Year, month, day		
Field Type: Numeric	Justification: Right	
Sampling Standard: n/a	Example entry: June 18, 1995	1 9 9 5 0 5 1 8

Element Name: Broad Type Disturbance	Form: 1	Cell Reference: 22
Code Definition	**Acceptable Codes**	
Wildfire	W	
Flood	F	
Logging	L	
Pest	P	
Slide	S	
Salvage	V	
Windthrow	W	
Other	O	
Field type: Character	Justification: n/a	
Sampling Standard: n/a	Example entry: logging	L

Element Name: Type of Harvesting	Form: 1	Cell Reference: 23
Code Definition	**Acceptable Codes**	
Conventional cable system	CAB	
Skyline cable system	SKY	
Skidder cable system	SKD	
Handfall/grapple skidder	HGR	
Feller buncher/grapple skidder	MGR	
Handfall/line skidder	HLS	
Feller buncher/line skidder	MLS	
Low ground pressure	LGP	
Horse skidding	HRS	
Helicopter	HEL	
Hoe chucking	HOE	
Push over logging	POL	
Other	OTH	
Field type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: Helicopter	H E L

Element Name: Type of Skidder	Form: 1	Cell Reference: 24
Code Definition	**Acceptable Codes**	
Light tracked skidder	L	
Low ground pressure	P	
Standard rubber tire	S	
Standard tracked skidder	T	
Field type: Character	Justification: n/a	
Sampling Standard: n/a	Example entry: standard tracked skidder	T

Element Name: Silivicultual System	Form: 1	Cell Reference: 25
Code Definition	**Acceptable Codes**	
Clearcut	CC	
Patch cut	PC	
Coppice	COP	
Seed tree	ST	
Overstorey removal (natural shelterwood)	OR	
Uniform shelterwood	USW	
Irregular shelterwood	ISW	
Group shelterwood	GSW	
Strip shelterwood	SSW	
Group selection	GSEL	
Strip selection	SSEL	
Single tree selection	STS	
Systems with reserves	SWR	
Other	OTH	
Field type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: clearcut	C C

Element Name: Site Preparation Technique	Form: 1	Cell Reference: 26
Code Definition	**Acceptable Codes**	
Biological	BI	
Burn	BU	
Chemical air	CA	
Chemical ground	CG	
Grass seeding	GS	
Manual	MA	
Mechanical	ME	
Other	OT	
Field type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: sheep grazing	B I

Element Name: Site Preparation Method		Form: 1	Cell Reference: 27
Code Definition	**Acceptable Codes**	**Code Definition**	**Acceptable Codes**
Grazing	GRAZE	Cable knockdown	CABLE
Broadcast burn	BBURN	Chain drag	CHAIN
Pile and burn	PBURN	C & H plow	CHPLO
Spot burn	SBURN	Leno model 77 or 81	LENO
Wildfire	WFIRE	Landing ripping	LRIP
Fixed wing	FIXED	Martinni plow	MARRI
Granular	GRANU	Hydraulic disc	MDISC
Helicopter	HELI	Machine knockdown	MDOWN
Basal spray	BASL	Mounding	MOUND
Backpack application	BPACK	VH mulcher	MULCH
EZject stem injection	EZJEC	Machine patch scarifier (excavator or Hawke scarifier only)	PATCH
Notch or frill individual tree	FRILL	Passive disc trencher	PDISC
Stem injection	SINJE	Piling	PILE
Hand site preparation	HANDP	Stump treatment	STUMP
Knockdown	KNOCK	Windrow	WIROW

Element Name: Site Preparation Method		Form: 1	Cell Reference: 27
Code Definition	**Acceptable Codes**	**Code Definition**	**Acceptable Codes**
Snag falling	SNAG	V-plow	VPLOW
Blading	BLADE	Vehicle mounted sprayer (fixed boom)	VMSFB
Hydroaxe	HYDRO	Vehicle mounted sprayer (sprayer hose)	VMSGH
Shark fin drag	SHARK	Other	OTHER
Bracke	BRACM		
Field type: Character		Justification: Left	
Sampling Standard: n/a		Example entry: broadcast burn	B B U R N

Element Name: Site Preparation Type		Form: 1	Cell Reference: 28
Code Definition	**Acceptable Codes**	**Code Definition**	**Acceptable Codes**
Prime mover/machine		2, 4-D amine (Forestamine 500)	FOR500
Excavator	EXCAV	2, 4-D amine (Forestamine 250)	FOR250
Skidder	SKIDR	2, 4-D amine (Dow Formula 40F)	DOW40F
FMC	FMC	2, 4-D amine (Silvamine 500)	SIL500
Bracke mounder	BRACKE	2, 4-D ester (Esteron 600)	EST600
Crawler tractor	CRAWL	2, 4-D (For-ester E.C.)	FOREST
Hawk scarifier	HAWK	2, 4-D ester+ 2-4-DP ester (Weedone CB)	WEEDCB
Chain saw	CSAW	Triclopyr (Release)	RLEASE
Chemical		**Biological**	
Glyphosate	VISION	Clover	CLOVR
Hexazinone (velpar liquid)	VELPARL	Grass	GRASS
Hexazinone (Pronone 5G)	PRON5	Sheep	SHEEP
Hexazinone (Pronone 10G)	PRON10	Cattle	CATTL
Field type: Character/Numeric		Justification: Left	
Sampling Standard: n/a		Example entry: sheep grazing	S H E E P

Element Name: Kg a.i. or a.e./ha (active ingredient or acid equivalent per hectare)	**Form: 1**	**Cell Reference: 29**
Code Definition	**Acceptable Codes**	
kg a.i./ha	enter number with decimal point	
Field type: Numeric	Justification: Right	
Sampling Standard: As per application rate	Example entry: using vision 1.42 kg a.i./ha	1 • 4 | 2

Element Name: Litres of solution/ha or millilitres of solution/frill	**Form: 5**	**Cell Reference: 30**
Code Definition	**Acceptable Codes**	
Rate of herbicide (litres or millilitres)		
Field type: Numeric	Justification: Right	
Sampling Standard: As per application rate (volume of solution)	Example entry: using vision 150 L/ha	1 | 5 | 0

Element Name: Space Between Notches	**Form: 1**	**Cell Reference: 31**
Code Definition	**Acceptable Codes**	
Enter the space between notches for stem injection. Notch or frill per tree.		
Field type: Numeric	Justification: Right	
Sampling Standard: Average distance ±1 cm	Example entry: 5 cm	| | 5

Element Name: Stocking Standards "A"	**Form: 1**	**Cell Reference: 32**
Identify the appropriate stocking standards from the Pre-Harvest Silviculture Prescription or Silviculture Prescription.		
Code Definition	**Acceptable Codes**	
Minimum spacing	as per SP	
Target sph	as per SP	
Minimum sph	as per SP	
Preferred species	see Cell No. 36 for species code	
Acceptable species	see Cell No. 36 for species code	
Field type: Spacing, sph - numeric, species - character	Justification: Numeric - right, Character - left	
Sampling Standard: n/a	Ex. entry: 1 | 6 | 1 | 2 | 0 | 0 | 7 | 0 | 0 | P | 1 | i	

Element Name: Stocking Standards "B"	Form: 1	Cell Reference: 33
Identify the appropriate stocking standards from the Pre-Harvest Silviculture Prescription or Silviculture Prescription. These particular standards are required for determining whether or not trees have met free-growing standards.		

Code Definition	Acceptable Codes
Regeneration delay	Number of years
Early assessment	Number of years
Late assessment	Number of years
Minimum height by species	Enter species on the top line and height requirement (cm) below
% above brush	%
Field type: numeric	Justification: right
Sampling Standard: n/a	

Example Entry:

regen delay 4 years, early assessment 9 years, late assessment 15 years, min. height for pine 2 m, other species 1.8 m, % above brush 150%

				P	L							
4	9	1	5	2	0	0	1	8	0	1	5	0

Element Name: Regeneration Technique	Form: 1	Cell Reference: 34

Code Definition	Acceptable Codes
Direct seeding	DS
Fill planting	FP
Manual	MA
Mechanical	ME
Planting	PL
Field type: Character	Justification: n/a
Sampling Standard: n/a	Example entry: fill plant FP

Element Name: Regeneration Method		Form: 1	Cell Reference: 35
Code Definition	Acceptable Codes	Code Definition	Acceptable Codes
Bareroot	BROOT	Hand spot seeding	SPOTS
Container	CTAIN	Cyclone seeder	CSEED
Whips	WHIP	Furrow seeder	FUROW
Auger	AUGER	Snowmobile	SNOW
Fixed wing	FIXED	Vehicle mounted slinger	VMSLI
Helicopter	HELI	Cones	CONE

Element Name: Regeneration Method	Form: 1	Cell Reference: 35
Field type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: Container	C T A I N

Element Name: Species		Form: 1	Cell Reference: 36
Code Definition		Acceptable Codes	
Tree Species Common Name	Tree Species Latin Name	Code	Subspecies, variety or cultivar
Black cottonwood	*Populus balsamifera* ssp. *trichocarpa* ssp *balsamifera*	Ac	Act Acb
Trembling aspen	*Populus tremuloides*	At	
Amabilis fir/Balsam fir	*Abies amabilis*	Ba	
Grand fir	*Abies grandis*	Bg	
Subalpine fir	*Abies lasiocarpa*	Bl	
Noble fir	*Abies procera*	Bn	
Western redcedar	*Thuja plicata*	Cw	
Red alder	*Alnus rubra*	Dr	
Paper birch	*Betula papyrifera*	Ep	
Douglas-fir	*Pseudostuga menziesii*, interior and coastal varieties	Fd	Fdi Fdc
Mountain hemlock	*Tsuga mertensiana*	Hm	
Western hemlock	*Tsuga heterophylla*	Hw	
Alpine larch	*Larix lyallii*	La	
Tamarack	*Larix latifolia*	Lt	
Western Larch	*Larix occidentalis*	Lw	
Whitebark pine	*Pinus albicaulis*	Pa	
Limber pine	*Pinus flexilis*	Pf	
Jack pine	*Pinus banksiana*	Pj	
Lodgepole pine	*Pinus contorta*, interior and coastal varieties	Pl	Pli Plc
Western white pine	*Pinus monticola*	Pw	
Ponderosa pine/Yellow pine	*Pinus ponderosa*	Py	
Black spruce	*Picea mariana*	Sb	
Englemann spruce	*Picea engelmannii*	Se	

Element Name: Species		**Form: 1**	**Cell Reference: 36**
Code Definition		**Acceptable Codes**	
Tree Species Common Name	Tree Species Latin Name	Code	Subspecies, variety or cultivar
Sitka spruce	*Picea sitchensis*	Ss	
White spruce	*Picea glauca*	Sw	
Hybrid spruce	*Picea hybrids*, white x black, white x Engelmann, white x Sitka, Englemann x Sitka, white x Engelmann x Sitka, Sitka x unknown hybrid	Sx	Sxb Sxw Sxl Sxe Sxx Sxs
Yellow-cedar	*Chamaecyparis nootkatensis*	Yc	
Field type: Character		Justification: Left	
Sampling Standard: n/a		Example entry: Interior Lodgepole pine	P C i

Element Name: Stock Type	**Form: 1**	**Cell Reference: 36**
Code Definition	**Acceptable Codes**	
Type	as per planting records	
Size	as per planting records	
Age	as per planting records	
Field type: Size and age - numeric; species and type - character	Justification: Numeric - right; character - left	
Sampling Standard: n/a	Example entry: Cw PSB 313B 1+0 C w P S B 3 1 3 B 1 + 0	P S B

Element Name: Seedlot	**Form: 1**	**Cell Reference: 37**
Code Definition	**Acceptable Codes**	
MOF seedlot number		
Field type: Numeric	Justification: Right	
Sampling Standard: n/a	Example entry: 2853	2 8 5 3

Element Name: Nursery		Form: 1	Cell Reference: 38
Code Definition	**Acceptable Codes**	**Code Definition**	**Acceptable Codes**
Arbutus Grove	AG	MOF Puckle Rd. Nursery	MY
Arbordale Nursery	AR	Nuu-Chah-Nulth	NC
Busy Bee Nursery	NN	North Road Lab	NR
Balco Nursery	BC	Northwood	NW
Canadian Forest Service	CF	Pelton	PL
Chilliwack	CH	Peace River Greenhouses	PR
Canadian Pacific Forest Products	CP	Reid-Collins	RC
Campbell River	CR	Ruffs Greenhouses	RG
Daveron Nursery Ltd.	DR	Rose Rim Nursery	RM
Elmore	EM	Red Rock	RR
Fletcher Challenge Canada	FC	Skimikin	SK
Green Timbers	GT	Sorrento Nursery	SO
Hi-Gro Silva Nursery	HG	Surrey	SR
Hammer Enterprises	HM	Silvertip	ST
Harrop	HR	Summit Nursery Ltd.	SU
Heffley Creek	HF	Sylvan Vale	SV
Hybrid Nursery Ltd.	HY	Thornhill	TH
Industrial Forestry Service	IF	Telkwa	TK
Jaro Forest Service	JR	UBC Nursery	UB
K and C Silviculture Farms	KC	Valentine Farm	VA
Kalum Forest Nursery	KN	Vernon	VR
Koksilah	KO	Woodmere Nursery Ltd.	WD
Kalamalka Research	KR	West Fraser	WF
MacMillan Bloedel Ltd.	MB	Weyerhaeuser Canada Ltd.	WY
Malaspina College	MC	Yellow Point	YP
Mesachie Lake	ML	Not given	NG
Mountainview Valley Farms	MV		
Field type: Character		Justification: Left	
Sampling Standard: n/a		Example entry: Harrop	H R

Element Name: Stand Tending Base Method	Form: 1	Cell Reference: 39
Code Definition	**Acceptable Codes**	
Brushing	BR	
Fertilization	FE	
Juvenile spacing	JS	
Pruning	PR	
Field type: Character	Justification: n/a	
Sampling Standard: n/a	Example entry: brushing	B R

Element Name: Stand Tending Technique	Form: 1	Cell Reference: 40
Code Definition	**Acceptable Codes**	
Biological	BI	
Chemical air	CA	
Chemical ground	CG	
Fire	FI	
Manual	MA	
Mechanical	ME	
Seedling protection	SP	
Field type: Character	Justification: n/a	
Sampling Standard: n/a	Example entry: fire	F I

Element Name: Stand Tending Method		Form: 1	Cell Reference: 41
Code Definition	**Acceptable Codes**	**Code Definition**	**Acceptable Codes**
Backpack application	BPACK	Marden chopper	MARDEN
Blading	BLADE	Machine knockdown	MDOWN
Brush saw	BRUSH	Micro-organism	MICRO
Chain drag	CHAIN	Motorized cutting	MOCUT
Cover crop	COVER	Motorized girdling	MOGIR
EZject stem injection	EZJEC	Mulching	MULCH
Fixed wing	FIXED	Extension pole	POLE
Granular application	GRANU	Power saw	POWER

Element Name: Stand Tending Method		Form: 1	Cell Reference: 41
Code Definition	**Acceptable Codes**	**Code Definition**	**Acceptable Codes**
Grazing	GRAZE	Stem bark spraying	SBARK
Hand pulling (removal)	HANDR	Sepi	SEPI
Handsaw	HANDS	Pruning shears	SHEAR
Helicopter	HELI	Stem injection	SINJE
Hydro-axe	HYDRO	Spot gun application	SPGUN
Insect	ISECT	Stump treatment	STUMP
Manual cutting	MANCT	Vehicle mounted sprayer (fixed boom)	VMSFB
Manual girdling	MANGI	Vehicle mounted sprayer (gun and hose)	VMSGH
Manual stem bending	MANUSB		
Field type: Character		Justification: Left	
Sampling Standard: n/a		Example entry: helicopter	H E L I

Element Name: Stand Tending Type		Form: 1	Cell Reference: 42
Code Definition	**Acceptable Codes**	**Code Definition**	**Acceptable Codes**
Prime mover		Sandvik	SANDV
Crawler prime mover	CRAWL	Scorp (girdling tool)	SCROP
FMC	FMC	Shear	SHEAR
Skidder	SKIDR	Vadenburg girdler	VERDEN
Biological		**Chemical**	
Cattle	CATTL	Glyphosate	VISION
Clover	CLOVR	Hexazinone (velpar liquid)	VELPARL
Grass	GRASS	Hexazinone (Pronone 5G)	PRON5
Sheep	SHEEP	Hexazinone (Pronone 10G)	PRON10
Hand tools		2, 4-D amine (Forestamine 500)	FOR500
Brush hook	BRHOOK	2, 4-D amine (Forestamine 250)	FOR250
Chain girdler (Beaver)	CHAIN	2, 4-D amine (Dow Formula 40F)	DOW40F
Chainsaw	CSAW	2, 4-D amine (Silvamine 500)	SIL500
Hatchet	HATCH	2,4-D ester (Esteron 600)	EST600

Element Name: Stand Tending Type		Form: 1	Cell Reference: 42
Code Definition	**Acceptable Codes**	**Code Definition**	**Acceptable Codes**
Hockey stick	HOCKEY	2, 4-D (For-ester E.C.)	FOREST
Knife	KNIFE	2, 4-D ester+ 2-4-DP Ester (Weedone CB)	WEEDCB
Kyuquot girdler	KYUQUO	Triclopyr (Release)	RLEASE
Machete	MACHET		
Field type: Character/Numeric		Justification: Left	
Sampling Standard: n/a		Example entry: sheep grazing	S H E E P

APPENDIX 2

Site Description and Soils Assessment (FORM-2)

SITE DESCRIPTION AND SOILS ASSESSMENT (FORM-2)

SITE DESCRIPTION

1. Administration No.
Forest Cover Map | Opening No. | Block | Installation No.

2. Site Name

3. Card ___ of ___

4. Initials of Recorders

5. Contractor

6. Measurement Date
y | m | d

7. PHOTO				
RMP	PMP	PMP	PMP	PMP
1				
2				
3				
4				

8. PMP No.	9. Position	10. Aspect	11. SLOPE			SITE CLASSIFICATION			
			Min. %	Max. %	Ave. %	12. Biogeoclimatic Zone	13. Subzone	14. V	15. Site series

16. Edatopic grid						Edatopic grid					
RSMR*	Soil nutrient regime					RSMR*	Soil nutrient regime				
Moisture	A	B	C	D	E	Moisture	A	B	C	D	E
0						0					
1						1					
2						2					
3						3					
4						4					
5						5					
6						6					
7						7					
8						8					
PMP No.						PMP No.					

Relative soil moisture regime

SOILS ASSESSMENTS

17. Parent material landform

18. Parent material bedrock

19. Effective rooting depth (cm)

20. Restricting layer depth (cm) Type

21. Soil Drainage Class

22. Flood hazard

23. Soil order

29. Site Sensitivity Hazard Ratings

C	S	F	E	M

Humus Description				
24. Humus Form				
25. Horiz.	26. Modif.	27. Average Thick. (cm)	28. Comp O.M	29. Root Abun.
S				
L				
F				
H				

Mineral Soil Description																				
30. Soil Horizon	31. Modifier			32. Ave. Thick. (cm)	33. Texture	Organic Matter		36. Percent Coarse Fragments	37. Composition of Coarse Fragments (Total = 100%)			28. Fine Root Abund.	38. Soil Colour			
	1	2	3			34. Composition	35. Von Post		% Gravel	% Cobbles	% Stones		Hue No.	Hue Letter	Value	Chroma
													.		.	
													.		.	
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													.		.	
													.		.	

COMMENTS:

EXPLORE

Instructions for Completing Site Description and Soils Assessment (FORM-2)

Element Name: Administration Number	**Form: 2**	**Cell Reference: 1**
Code Definition	**Acceptable Codes**	
Record the Forest Cover Map sheet number, the opening number, the Block and the Installation number.	Forest cover map sheet number Opening no. 001 - 999 Block: cutblock number Installation no. 001 - 999	
Field Type: Number	Justification: Right	
Sampling Standard: n/a	Example entry: 093J081 022 003 001	

Element Name: Site Name	**Form: 2**	**Cell Reference: 2**
Use the colloquial name for the site, using standard abbreviations for creeks, rivers, or lakes.		
Field Type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: Soards Creek	SOARDS CRK

Element Name: Card Number	**Form: 2**	**Cell Reference: 3**			
Code Definition	**Acceptable Codes**				
Page number and number of pages	Whole number > 0				
Field type: Numeric	Justification: n/a				
Sampling Standard: n/a	Example entry: Card 1 of 2	Card:	1	of	2

Element Name: Initials of Recorders	**Form: 2**	**Cell Reference: 4**
Code Definition	**Acceptable Codes**	
Record initials of both crew members	provide all 3	
Field type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: Andy P. Donut	APD

Element Name: Contractor	**Form: 2**	**Cell Reference: 5**
Code Definition	**Acceptable Codes**	
Up to 8 letters of the contractor's name		
Field type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: IFS	IFS

Element Name: Measurement Date	Form: 2	Cell Reference: 6
Record time of measurement (to allow relation to harvesting and other activity dates, for data analysis and scheduling other measurements).		
Code Definition	**Acceptable Codes**	
Year, month, day		
Field Type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: (Sept. 5, 1996)	1 9 9 6 0 9 0 5

Element Name: Photographs	Form: 2	Cell Reference: 7
During installation measurement, take at least one 35 mm photograph of each RMP. With the camera at the PMP centre, shoot the centre of each RMP.		
Code Definition	**Acceptable Codes**	
Write PMP number and enter photograph number	n/a	
Field Type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: Photograph number	15

Element Name: PMP Number	Form: 2	Cell Reference: 8
Code Definition	**Acceptable Codes**	
Enter the plot number in the installation	Whole number > 0	
Field type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: Plot 1	1

Element Name: Position (mesoslope)	Figure 2-1 Form: 2	Cell Reference: 9
Code Definition	**Acceptable Codes**	
Crest	a	
Upper slope	b	
Middle slope	c	
Lower slope	d	
Toe	e	
Depression	f	
Level	g	
Field type: Character	Justification: n/a	
Sampling Standard: n/a	Example entry: midslope	c

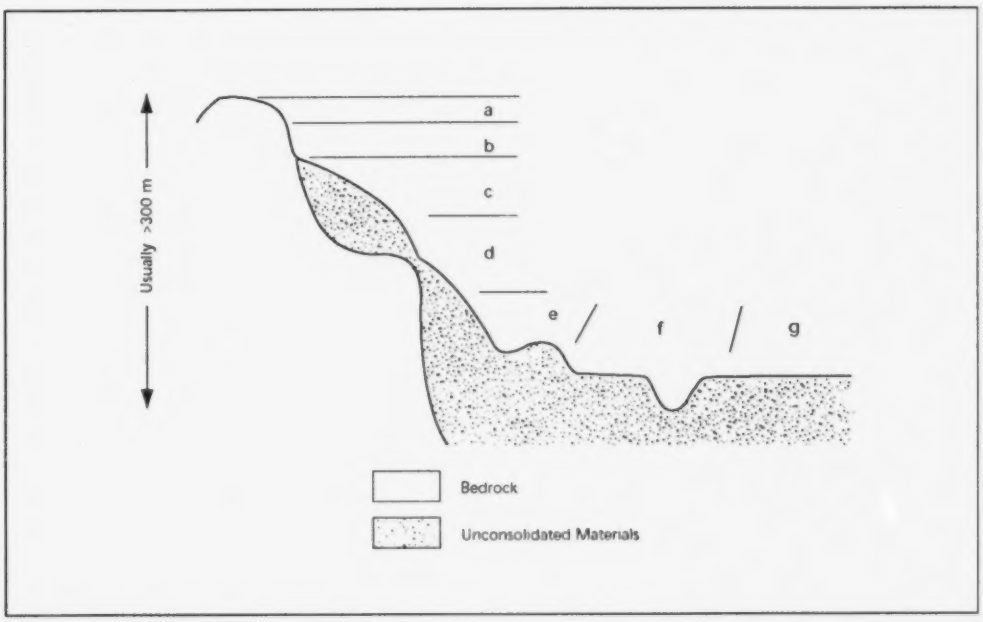


FIGURE A2-1 *Schematic cross-section illustrating terms used to describe mesoslope position (after Luttmerding et al. 1990).*

Element Name: Aspect	**Form: 2**	**Cell Reference: 10**
Code Definition	**Acceptable Codes**	
Aspect	0–360	
Variable	VAR	
Flat	FLT	
Field type: Numeric or character	Justification: Right	
Sampling Standard: ±10°	Example entry: 45°	4 5

Element Name: Slope Percent	**Form: 2**	**Cell Reference: 11**
Code Definition	**Acceptable Codes**	
Minimum, maximum, and average slopes in percent	0 to 150	
Field type: Numeric	Justification: Right	
Sampling Standard: ±5%	Example entry: 10–25, avg. 15	1 0 2 5 1 5

Element Name: Biogeoclimatic Zone		Form: 2	Cell Reference: 12
Code Definition	**Acceptable Codes**	**Code Definition**	**Acceptable Codes**
Boreal White and Black Spruce	BWBS	Montane Spruce	MS
Coastal Western Hemlock	CWH	Mountain Hemlock	MH
Englemann Spruce–Subalpine Fir	ESSF	Spruce–Willow–Birch	SWB
Interior Cedar–Hemlock	ICH	Sub-Boreal Spruce	SBS
Interior Douglas-fir	IDF	Sub-Boreal Pine–Spruce	SBPS
Field Type: Character		Justification: Left	
Sampling Standard: n/a		Example entry: ICH	I C H

Element Name: Biogeoclimatic Subzone		Form: 2	Cell Reference: 13
Code Definition	**Acceptable Codes**	**Code Definition**	**Acceptable Codes**
1st letter - actual precipitation regime		2nd letter - Interior zones temperature regime	
Very dry (xeric)	x	Hot	h
Dry	d	Warm	w
Moist	m	Mild	m
Wet	w	Cool (kool)	k
Very wet	v	Cold	c
2nd letter - coastal zones continentality		Very cold	v
Hypermaritime	h		
Maritime	m		
Submaritime	s		
Field Type: Character		Justification: n/a	
Sampling Standard: n/a		Example entry: moist cold	m c

Element Name: Variant	Form: 2	Cell Reference: 14
Code Definition	**Acceptable Codes**	
As associated with the appropriate subzone, see the relevant Ecosystem Field Guide.	numbers	
Field Type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: 2	2

Element Name: Site Series	Form: 2	Cell Reference: 15
Code Definition	**Acceptable Codes**	
Enter the code for site series that best describes the subplot	01 to 10	
Field Type: Numeric	Justification: Left	
Sampling Standard: n/a	Example entry: 06	0 6

Element Name: Edatopic Grid	Form: 2	Cell Reference: 16
Code Definition	**Acceptable Codes**	
Using the keys in the Biogeoclimatic Classification Guides, enter the edatopic grid for each quadrant. Enter the codes for one (100%) or two (x+y = 100%) edatopic grid that best describes the quadrant. Note that proportions of rock and water are also accommodated in these grids in conjunction with productive ground.	Percent =10 to 100 Edatopic grid = Nutrients (A to E) and moisture (1 to 7), R, W	
Field type: Numeric and character	Justification: Right	
Sampling Standard: ±1 unit	Example entry: 70% 2C and 30% 3D	2 C 7 0 3 D 3 0

Element Name: Parent Material Landform	Form: 2	Cell Reference: 17
Code Definition	**Acceptable Codes**	
Colluvial: Angular coarse fragments; particle size variable, loose deposits; usually at the base of steep slopes; coarse fragments usually touch each other.	C	
Morainal: Generally subangular or variable angularity coarse fragments; heterogeneous mix of all particle sizes; often can feel some clay in subsoil (even if not in texture name); may be compacted or loose; deposited by glaciers (e.g., till); often looks like dense "rice pudding with raisins" (large rocks separated from each other); may have a few coarse fragments if derived from weak/fine bedrocks, but some of these would not be from the local bedrock.	M	
Organic: Organic material > 40 cm thick formed from decomposing vegetation on saturated sites (e.g., bogs, fens, swamps, and localized seeps in mountains).	O	
Eolian: Loose fine sand, or silt; well sorted not compacted, deposited by wind; often a thin capping over another material; may have some buried coarse fragments.	E	
Lacustrine: Layered and sorted silt, clay, and sometimes fine sand; lakebed deposits may be denser at depth; may have rare coarse fragments; often terraced.	L	
Weathered rock: Generally, non-sorted, non-layered, weak/fine textured, weathered bedrock; large fragments are the same as nearby bedrock; may be clayey.	D	
Fluvial: Dominantly rounded coarse fragments; generally sorted and layered sands and gravel; rarely any clay, usually loose (e.g., gravel pit). Deposited postglacially by streams and rivers (alluvial); deposits at or slightly above stream level (floodplain or terraces); or fans at mouths of streams.	F	
Glaciofluvial: Deposited by glacial meltwater, often as terraces or on valley sides; terraces or fans well above present stream level; may have irregular surface; may contain large boulders; layering may be irregular or include some silty or clayey material.	G	
Weathered bedrock: Large fragments are the same as nearby bedrock, and may be crumbly.	R	
Field Type: Character	Justification: n/a	
Sampling Standard: n/a	Example entry: Lacustrine	L

Element Name: Parent Material - Bedrock Type		Form: 2	Cell Reference: 18
This will identify the richness of the dominant parent material present			
Code Definition	**Acceptable Codes**	**Code Definition**	**Acceptable Codes**
Basalt: dark colour (black, red)	01	Schist	11
Andesite (greenstone)	02	Gneiss	12
Quartzite (light colour)	03	Sandstone	13
Limestone	04	Conglomerate	14
Slate	05	Gabbro	15
Phyllite	06	Granite and Granodiorite	16
Shale	07	Quartzite	17
Mudstone, Argillite, Siltstone	08	(Quartz) Diorite	18
Serpentine	09	Conglomerate	19
Marble	10	Breccia	20
Field type: Numeric		Justification: n/a	
Sampling Standard: n/a		Example entry: shale	0 7

Element Name: Effective Rooting Depth	Form: 2	Cell Reference: 19
Code Definition	**Acceptable Codes**	
Effective rooting depth in cm (where the last fine root is visible)	Whole number > 0.	
Field type: Numeric	Justification: Right	
Sampling Standard: ±1 cm	Example entry: 38 cm	3 8

Element Name: Restricting Layer Depth	Form: 2	Cell Reference: 20
Code Definition	**Acceptable Codes**	
Depth to root restricting layer in cm	Whole number > 0	
Field type: Numeric	Justification: Right	
Sampling Standard: ±1 cm	Example entry: 22 cm	2 2

Element Name: Restricting Layer Type	Form: 2	Cell Reference: 20
Code Definition	**Acceptable Codes**	
Compact till	1	
Cemented	2	
Hardpan	3	
Rock	4	
Orstein	5	
Water	6	
Field type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: cemented	2

Element Name: Soil Drainage Class	Form: 2	Cell Reference: 21
Code Definition	**Acceptable Codes**	
Rapidly drained: soil moisture content seldom exceeds field capacity in any horizon except immediately after water addition.	R	
Well drained: soil moisture content does not normally exceed field capacity in any horizon (except possibly C) for a significant part of the year.	W	
Moderately well drained: soil moisture remains in excess of field capacity for a small but significant period of the year.	M	
Imperfectly drained: soil moisture remains in excess of field capacity in subsurface horizons for moderately long periods during the year.	I	
Poorly drained: soil moisture content remains in excess of field capacity in all horizons for a large part of the year.	P	
Very poorly drained: soil moisture remains at or within 30 cm of the surface most of the year.	V	
Field type: Character	Justification: n/a	
Sampling Standard: n/a	Example entry: well drained	W

Element Name: Flood Hazard	Form: 2	Cell Reference: 22
Code Definition	**Acceptable Codes**	
Frequent but irregular Frequent May be expected or occasional Rare No hazard or unlikely	A B C D E	
Field type: Character	Justification: n/a	
Sampling Standard: n/a	Example entry: frequent flooding	B

Element Name: Soil Order	Form: 2	Cell Reference: 23
Code Definition	**Acceptable Codes**	
Chernozem Cryosol Brunisol Gleysol Luvisol Organic Podzol Regosol Solonetz	CHERNOZEM CRYOSOL BRUNISOL GLEYSOL LUVISOL ORGANIC PODZOL REGOSOL SOLONETZ	
Field type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: podzol	P O D Z O L

Element Name: Humus Form	Form: 2	Cell Reference: 24
Used for site classification and determination of nutrient regime.		

Code Definition	Acceptable Codes
Hemimor: Well drained site; combined thickness of F and H horizons > 2 cm or ≤ 2 cm if Ah < 2 cm; distinct, matted F horizon > 50% of thickness of combined F and H horizons; decaying wood ≤ 35% of organic volume in humus form profile.	HEMIMOR
Humimor: Same as Hemimor but Hh horizon 50% of thickness of F and H horizons.	HUMIMOR
Resimor: Same as Hemimor but Hr horizon 50% of thickness of F and H horizons.	RESIMOR
Lignomor: Well drained site; combined thickness of F and H horizons > 2 cm or ≤ 2 cm if Ah < 2 cm; distinct, matted F horizon; decaying wood > 35% of organic matter volume in humus profile.	LIGNOMOR
Hydromor: Poorly drained site; combined thickness of F and H horizons > 2 cm or ≤ 2 cm if Ah < 2 cm, F and H horizons > O horizon.	HYDROMOR
Fibrimor: Poorly drained site; combined thickness of F, H, and O horizons > 2 cm or ≤ 2 cm if Ah < 2 cm; O horizons thicker than F and H horizons; Of horizon > 50% of O horizon thickness.	FIBRIMOR
Mesimor: Same as Fibrimor but Om horizon ≥ 50% of O horizon thickness.	MESIMOR
Mormoder: Well drained site; combined thickness of F and H horizons > 2 cm or ≤ 2 cm if Ah < 2 cm; unmatted, intermixed F horizon; decaying wood < 35% of organic matter volume in humus form profile; Fa horizon > 50% of thickness of F horizons, or Fm horizon present.	MORMODER
Leptomoder: Same as Mormoder but Fz horizon > 50% thickness of F horizons; F and H horizons > thickness of Ah horizon.	LEPTOMODER
Mullmoder: Same as Leptomoder but F and H horizons < thickness of Ah horizon.	MULLMODER
Lignomoder: Well drained site; combined thickness of F and H horizons > 2 cm or < 2 cm if Ah < 2 cm; unmatted, intermixed F horizon; decaying wood > 35% of organic matter volume in humus form profile.	LIGNOMODER
Saprimoder: Same as Fibrimor but Oh horizon >50% of O horizon thickness.	SAPRIMODER
Hydromoder: Same as Hydromor but F horizon(s) includes Fz and/or Fa.	HYDROMODER
Verimull: Thin F, H horizon (< 1 cm each); combined thickness of F and H horizons < 2 cm with Ah horizon 2 cm; intermixing of O, H, and F layers; zoogenous Ah horizon formed through action of abundant earthworms.	VERIMULL
Rhizomull: Same as Verimull but rhizogenous Ah horizon formed from decomposition of dense fine roots.	RHIZOMULL
Hydromull: Poorly drained site; combined thickness of F, H, and O horizons < 2 cm with Ah horizon 2 cm.	HYDROMULL

Field type: Character	Justification: Left										
Sampling Standard: n/a	Example entry: Hydromor	H	Y	D	R	O	M	O	R		

Element Name: Modifier (Subordinate humus horizons)	Form: 2	Cell Reference: 25
Code Definition		**Acceptable Codes**
- An L (new) horizon composed of newly accreted and essentially unfragmented plant residues.		n
- An L (variative) horizon exhibiting initial decay and strong discoloration.		v
- An F (mycogenous) horizon in which plant residues are aggregated in a matted structure, with a tenacious consistency.		m
- An F (zoogenous) horizon in which plant residues are weakly aggregated with a loose or friable consistency.		z
- An F (amphi) horizon in which plant residues are aggregated into a weak to moderate, noncompact matted structure.		a
- An H (humic) horizon predominated by fine substances with very few if any recognizable plant residues.		h
- An H (zoogenous) horizon predominated by fine substances with very few if any recognizable plant residues; faunal droppings constitute most of the fabric.		z
- An H (residues) horizon predominated by fine substances but also contains recognizable plant residues, usually fine roots, bark, or wood.		r
- An O (fibric) horizon consisting largely of poorly decomposed plant residues that are readily identifiable as to origin.		f
- An O (mesic) horizon consisting of partly decomposed plant residues which are at a stage of decomposition intermediate between Of and Oh horizons.		m
- An O (humic) horizon consisting of well decomposed plant residues that for the most part have been transformed into humic materials.		h
The following lowercase suffixes may be applied to any organic horizon		
- i (intermixed): a horizon containing intermixed mineral particles finer than 2 mm, with 17–35% organic carbon mass.		i
- p (plowed): a horizon that has been substantially altered or disrupted by human activities, primarily by site management practices, including logging and site preparation.		p
- u: a horizon that has been substantially altered or disrupted by natural processes, such as tree blowdowns, animal burrowing, and erosion events.		u
- w (wood): a horizon containing significant amounts (> 35% of the volume of solids) of coarse woody debris in various stages of decomposition.		w
- Can further subdivide vertically within a profile.		1,2,3...
Field type: Character	Justification: Left (2 single-character fields allows for 2 entries)	
Sampling Standard: n/a	Example entry:	n

Element Name: Average Humus Thickness	Form: 2	Cell Reference: 26
Code Definition	**Acceptable Codes**	
Humus thickness, measured to top of mineral soil in cm		
Field type: Numeric	Justification: Right	
Sampling Standard: ± 0.5 cm	Example entry: 12.0 cm	1 2 0

Element Name: Organic Material Description	Form: 2	Cell Reference: 27

To identify soil nutrient inputs, note dominant type of recognizable organic material for each horizon. In the horizon column codes for humus horizons are provided and no entry is required. S = moss, L = litter, F = fibric, H = humic.

Code Definition	Acceptable Codes	Code Definition	Acceptable Codes
Angiosperm leaves	1	Herbaceous fragments	6
Conifer needles	2	Coprogenous earth	7
Sphagnum moss	3	Woody material all sizes	8
Other mosses, sphagnum spp.	4	Other: specify under horizon notes	9
Sedges, reeds, associated plants	5		

Field type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: conifer needles	2

Element Name: Fine Root Abundance	Form: 2	Cell Reference: 28

Quantify the number of fine roots (< 2 mm diameter) in a cross-sectional area (10 cm × 10 cm).

Code Definition	Acceptable Codes
None: (fine roots/100 cm^2 = 0)	1
Few: (fine roots/100 cm^2 = 3–10)	2
Common: (fine roots/100 cm^2 = 11–20)	3
Plentiful: (fine roots/100 cm^2 = 20–100)	4
Abundant: (fine roots/100 cm^2 = >100)	5

Field type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: 15 fine roots/100 cm^2	3

Element Name: Site Sensitivity Hazard Rating	Form: 2	Cell Reference: 29

Calculate the hazard rating for each category according to the "Hazard Assessment keys for Evaluating Site Sensitivity to Soil Degrading Processes Guidebook," as below:
C = compaction S = soil displacement F = forest floor displacement E = surface soil erosion M = mass wasting

Code Definition	Acceptable Codes
Low	L
Moderate	M
Heavy	H
Very heavy	VH

Field type: Character	Justification: n/a						
Sampling Standard: n/a	Example entry: moderate compaction	C	S	F	E	M
		M				

Element Name: Mineral Soil Horizons		Form: 2	Cell Reference: 30
Mineral horizons contain 17% or less organic C (about 30% organic matter) by weight			
Code Definition	**Acceptable Codes**	**Code Definition**	**Acceptable Codes**
Definitions attached	A B C		R W
Field type: Character		Justification: n/a	
Sampling Standard: n/a		Example entry: conifer needles	2

Soil horizons:

Mineral horizons contain 17% or less organic C (about 30% organic matter) by weight.

A This is a mineral horizon formed at or near the surface in the zone of leaching or eluviation of materials in solution or suspension, or of maximum in situ accumulation of organic matter or both. The accumulation of organic matter is usually expressed morphologically by a darkening of the surface soil (Ah), and conversely the removal of organic matter is usually expressed by a lightening of the soil colour usually in the upper part of the solum (Ac). The removal of clay from the upper part of the solum (Ae) is expressed by a coarser soil texture relative to the underlying subsoil layers. The removal of iron is indicated usually by a paler or less red soil colour in the upper part of the solum (Ac) relative to the lower part of the subsoil.

B This is a mineral horizon characterized by enrichment in organic matter, sesquioxides, or clay; or by the development of soil structure; or by a change of colour denoting hydrolysis, reduction, or oxidation. The accumulation in B horizons or organic matter (Bh) is evidenced usually by dark colours relative to the C horizon. Clay accumulation is indicated by finer soil textures and by clay cutans coating peds and lining pores (Bt). Soil structure developed in B horizons includes prismatic or columnar units with coatings or stainings and significant amounts of exchangeable sodium (Bn) and other changes of structure (Bm) from that of the parent material. Colour changes include relatively uniform browning due to oxidation of iron (Bm), and mottling and gleying of structurally altered material associated with periodic reduction (Bg).

C This is a mineral horizon comparatively unaffected by the pedogenic processes operative in A and B (C), except the process of gleying (Cg), and the accumulation of calcium and magnesium carbonates (Cca) and more soluble salts (Sc,Csa). Marl, diatomaceous earth, and rock no harder than 3 on Moths' scale are considered to be C horizons.

R This is a consolidated bedrock layer that is too hard to break with the hands (>3 on Mohs' scale) or to dig with a spade when moist and does not meet the requirements of a C horizon. The boundary, between the R layer and any overlying unconsolidated material is called a lithic contact.

W This is a layer of water in Gleysolic, Organic, or Cryosolic soils. Hydric layers in Organic soils are a kind of W layer.

Element Name: Horizon Modifier	Form: 2	Cell Reference: 31
For complete soils profile description, identifies soil processes, important for site productivity		
Code Definition	**Acceptable Codes**	
Suffix designations may be one or more of the acceptable codes	b, c, ca, cc, co, e, f, g, h, j, k, m, n, p, s, sa, t, u, x, y, z	
Field type: Character	Justification: Right	
Sampling Standard: n/a	Example entry: weak expression of gleying	g j

Element Name: Average Soil Horizon Thickness	Form: 2	Cell Reference: 32
Soil thickness, combined with soil horizon description, defines soils order (has implications for site productivity)		
Code Definition	**Acceptable Codes**	
Soil horizon thickness is depth to bedrock in cm	Whole number ≥ 0	
Field type: Numeric	Justification: Right	
Sampling Standard: ±1 cm	Example entry: 15 cm	1 5

Element Name: Soil Texture		Form: 2	Cell Reference: 33
Code Definition	**Acceptable Codes**	**Code Definition**	**Acceptable Codes**
Loam	L	Silty Clay	SiC
Silty Loam	SiL	Clay	C
Silt	Si	Heavy Clay	HC
Sandy Clay Loam	SCL	Sand	S
Clay Loam	CL	Sandy Loam	SL
Silty Clay Loam	SiCL	Loamy Sand	LS
Sandy Clay	SC		
Field type: Character		Justification: Left	
Sampling Standard: n/a		Example entry: Sandy loam	S L

Element Name: Organic Material Description (Composition)		Form: 2	Cell Reference: 34
Note the dominant type of recognizable organic material for each horizon (to identify soil nutrient inputs)			
Code Definition	**Acceptable Codes**	**Code Definition**	**Acceptable Codes**
Angiosperm leaves Conifer needles Sphagnum moss Other mosses, sphagnum spp. Sedges, reeds, associated plants	1 2 3 4 5	Herbaceous fragments Coprogenous earth Woody material all sizes Other: describe in comments	6 7 8 9
Field type: Numeric		Justification: n/a	
Sampling Standard: n/a		Example entry: conifer needles	2

Element Name: Von Post Scale of Decomposition	Form: 2	Cell Reference: 35

Code Definition	Acceptable Codes
Undecomposed: plant structures unaltered; yields only clear water, coloured light yellow brown or colourless.	01
Almost undecomposed: plant structures distinct; yields almost clear water coloured light yellow brown.	02
Very weakly decomposed: plant structures distinct, yields distinctly turbid brown water; no peat substance passes between the fingers; residue not mushy.	03
Weakly decomposed: plant structures distinct; yields strong turbid brown water, no peat substance escapes between the fingers; residue rather mushy.	04
Moderately decomposed: plant structures clear but becoming indistinct; yields much turbid brown water, some peat escapes between the fingers; residue very mushy.	05
Moderately strongly decomposed: plant structures somewhat indistinct but clearer in the squeezed residue than in the undisturbed peat; about a third of the peat escapes between the fingers, residue strongly mushy.	06
Strongly decomposed: plant structures indistinct but recognizable; about half the peat escapes between the fingers.	07
Very strongly decomposed: plant structures very indistinct; about two-thirds of the peat escapes between the fingers, residue almost entirely resistant; remnants root fibres and wood.	08
Almost completely decomposed: plant structures unrecognizable; nearly all the peat escapes between the fingers.	09
Completely decomposed: plant structures unrecognizable, all the peat escapes between the fingers.	10

Field type: Numeric	Justification: Right		
Sampling Standard: n/a	Example entry: strongly decomposed	0	7

Element Name: Total Percentage of Coarse Fragments	Form: 2	Cell Reference: 36-37

Important for site productivity, soil disturbance, and choosing silviculture treatments.

Code Definition	Acceptable Codes
Coarse fragments (> 2 mm diameter) are described by size class and recorded as an estimated volume. They are estimated visually as a percent of the whole soil volume: % stones + % cobbles + % gravels + % fine fraction = 100% (total soil).	Whole number from 1–100.

Field type: Numeric	Justification: Right		
Sampling Standard: ± 1%	Example entry: 25% coarse fragments	2	5

Element Name: Soil Colour	Form: 2	Cell Reference: 38
Soil colour is determined by comparison with the Munsell colour charts.		
Code Definition	**Acceptable Codes**	
Hue number (colour).	2.5, 3, 7.5, 10	
Hue letter: this is the letter abbreviation of the colour of rainbow.	N, Y, G, GY, BG, B, PB, R, YR	
Value: indicates the degree of lightness.	0 (absolute black) to 10 (absolute white)	
Chroma: indicates the relative purity of colour strength (degree of dilution by natural grey of the same value).	0 (for natural grey) to 8 (for strongest expression)	
Field type: Numeric and character	Justification: hue number enter right justified to the decimal point, hue letters left justified, decimal periods for value and chroma.	

Sampling Standard: n/a	Example: yellowish-red, strong brown		7 • 5	Y	R	5 • 0	8 • 0

APPENDIX 3

Tree Measurements (FORM-3)

TREE MEASUREMENTS (FORM-3)

1. Administration No.

Forest Cover Map | Opening No. | Block | Installation No. | 2. Site Name | 3. Card ___ of ___

4. PMP No. | 5. Measurement Date (y m d) | 6. Initials of Recorders | 7. Contractor

8. Tree No.	9. Species	10. RCD (cm)	11. DBH (cm)	12. Height (m)	13. HCB (m)	14. Crown Width (m) E - W	14. Crown Width (m) E - W	15. Vigour	16. Damaging Agent

COMMENTS

TREE MEASUREMENTS (FORM-3)

1. Administration No.
Forest Cover Map | Opening No. | Block | Installation No.

2. Site Name

3. Card of

4. PMP No.

5. Measurement Date (y m d)

6. Initials of Recorders

7. Contractor

8. Tree No.	17. Severity	18. Tree Condit.	19.* Foliage Condit.	20.* Leader Condit.	21.* Leader Length (cm)	22.* Internode length (cm) 1	22.* Internode length (cm) 2	23.* Age	24.** Pathol. Indicators	25.** Position on Tree	26.** % Live Crown	27.** TA

NOTE: * columns 19-23 measurements are for 36 gridpoint sample trees in younger stands;
** columns 24-27 measurements are for stand description in mature stands;

COMMENTS

Instructions for Completing Tree Measurements (FORM-3)

Element Name: Administration Number	Form: 3	Cell Reference: 1
Code Definition	**Acceptable Codes**	
Record the Forest Cover Map sheet number, the opening number, the Block and the Installation number	Forest cover map sheet number Opening no. 001–999 Block: cutblock number Installation no. 001–999	
Field Type: Numeric	Justification: Right	
Sampling Standard: n/a	Example entry: 093J081022003001	

Element Name: Site Name	Form: 3	Cell Reference: 2
Use the colloquial name for the site, using standard abbreviations for creeks, rivers, or lakes		
Field Type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: Soards Creek	SOARDS CRK

Element Name: Card Number	Form: 3	Cell Reference: 3
Code Definition	**Acceptable Codes**	
Page number and number of pages	Whole number > 0	
Field type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: Card 1 of 2	Card: 1 of 2

Element Name: PMP Number	Form: 3	Cell Reference: 4
Code Definition	**Acceptable Codes**	
Enter the plot number in the installation	Whole number > 0	
Field type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: Plot 1	1

Element Name: Measurement Date	Form: 3	Cell Reference: 5
Code Definition	**Acceptable Codes**	
Year, month, day		
Field Type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: (Sept. 5, 1996)	19960905

Element Name: Initials of Recorders	**Form: 3**	**Cell Reference: 6**
Code Definition	**Acceptable Codes**	
Record initials of both crew members	provide all 3	
Field type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: Andy P. Donut	A P D

Element Name: Contractor	**Form: 3**	**Cell Reference: 7**
Code Definition	**Acceptable Codes**	
Up to 8 letters of the contractor's name		
Field type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: IFS	I F S

Element Name: Tree Number	**Form: 3**	**Cell Reference: 8**
Code Definition	**Acceptable Codes**	
Enter tree number from tree tag	Whole number 0–9999.	
Field type: Numeric	Justification: Right	
Sampling Standard: n/a	Example entry:	1 1 0 6

Element Name: Species		**Form: 3**	**Cell Reference: 9**
Code Definition		**Acceptable Codes**	
Tree Species Common Name	Tree Species Latin Name	Code	Subspecies, variety or cultivar
Black cottonwood	*Populus balsamifera* ssp. *trichocarpa* ssp. *balsamifera*	Ac	Act Acb
Trembling aspen	*Populus tremuloides*	At	
Amabilis fir/ Balsam fir	*Abies amabilis*	Ba	
Grand fir	*Abies grandis*	Bg	
Subalpine fir	*Abies lasiocarpa*	Bl	
Noble fir	*Abies procera*	Bn	
Western redcedar	*Thuja plicata*	Cw	
Red alder	*Alnus rubra*	Dr	
Paper birch	*Betula papyrifera*	Ep	
Douglas-fir	*Pseudotsuga menziesii*, interior and coastal varieties	Fd	Fdi Fdc
Mountain hemlock	*Tsuga mertensiana*	Hm	

Element Name: Species		**Form: 3**	**Cell Reference: 9**
Code Definition		**Acceptable Codes**	
Tree Species Common Name	Tree Species Latin Name	Code	Subspecies, variety or cultivar
Western hemlock	*Tsuga heterophylla*	Hw	
Alpine larch	*Larix lyallii*	La	
Tamarack	*Larix laricina*	Lt	
Western larch	*Larix occidentalis*	Lw	
Whitebark pine	*Pinus albicaulis*	Pa	
Limber pine	*Pinus flexilis*	Pf	
Jack pine	*Pinus banksiana*	Pj	
Lodgepole pine	*Pinus contorta*, interior and coastal varieties	Pl	Pli Plc
Western white pine	*Pinus monticola*	Pw	
Ponderosa pine/yellow pine	*Pinus ponderosa*	Py	
Black spruce	*Picea mariana*	Sb	
Englemann spruce	*Picea engelmannii*	Se	
Sitka spruce	*Picea sitchensis*	Ss	
White spruce	*Picea glauca*	Sw	
Hybrid spruce	*Picea hybrids*, white x black, white x Engelmann, white x Sitka, Englemann x Sitka, white x Engelmann x Sitka, Sitka x unknown hybrid	Sx	Sxb Sxw Sxl Sxe Sxx Sxs
Yellow-cedar	*Chamaecyparis nootkatensis*	Yc	
Field type: Character		Justification: Left	
Sampling Standard: n/a		Example entry: lodgepole pine (interior)	P l i

Element Name: Root Collar Diameter (RCD) (cm)	**Form: 3**	**Cell Reference: 10**
Code Definition	**Acceptable Codes**	
Root Collar Diameter measurements are taken on trees with heights ≤ 2 m, i.e., layer A5 trees (seedlings) only.	Must be a decimal number > 0.0	
Field type: Numeric	Justification: Decimal aligned	
Sampling Standard: ± 0.01 cm	Example entry: 1.85 cm	1 • 8 5

Element Name: DBH (cm)	Form: 3	Cell Reference: 11		
Code Definition	**Acceptable Codes**			
Diameter at breast height (DBH) measurements are taken from high side of the base of the tree, for trees ≥ 1.3 m in height.	Must be a decimal number > 0.0			
Field type: Numeric	Justification: Decimal aligned			
Sampling Standard: ± 0.01 cm	Example entry: 40.6 cm	0	4	0 • 6

Element Name: Tree Height (m)	Form: 3	Cell Reference: 12		
Code Definition	**Acceptable Codes**			
Record height measurement to the base of the bud. Measurement to the top of the bud would result in incorrectly double-counting the height of the bud, and the height increment (leader length) and tree height increments would not add correctly.	Must be > 0			
Field type: Numeric	Justification: Decimal aligned			
Sampling Standard: ± 0.01 cm	Example entry: 21.30 m	2	1 • 3	0

Element Name: Height to Crown Base (m)	Form: 3	Cell Reference: 13		
Code Definition	**Acceptable Codes**			
Height to the base of the main live crown (not just the first live branch).	Must be a whole number > 0			
Field type: Numeric	Justification: Right			
Sampling Standard: ± 10 cm if the height pole is used; ± 1 m if use of Suunto clinometer is required.	Example entry: 15.30 m	1	5 • 3	0

Element Name: Crown Width (m)	Form: 3	Cell Reference: 14		
Code Definition	**Acceptable Codes**			
Measured as the average distance out to the edge of the crown drip zone in each direction (East–West, North–South).	Must be a whole number > 0			
Field type: Numeric	Justification: Decimal aligned			
Sampling Standard: To the nearest ± 0.01 m	Example entry: 11.25 m	1	1 • 2	5

Element Name: Vigour		Form: 3	Cell Reference: 15
Code Definition	**Acceptable Codes**	**Code Definition**	**Acceptable Codes**
Dead	0	**Moderate**: overall growth rate and condition lower than open-grown seedling	3
Moribund: near death, little or no visible shoot growth	1	**Good**: growth rate and quality similar to open-grown seedling	4
Poor: minimal shoot growth, small needle complement, etiolated shoot development, tendency for poor form due to inadequately rigid stem	2		
Field type: Numeric		Justification: n/a	
Sampling Standard: n/a		Example entry: Good growth rate	4

Element Name: Damaging Agent		Form: 3	Cell Reference: 16
Code Definition	**Acceptable Codes**	**Code Definition**	**Acceptable Codes**
No detectable abiotic or biotic damage	O		
A: ANIMAL DAMAGE			
bear	AB	hare or rabbit	AH
mountain beaver	ABM	moose	AM
cattle	AC	porcupine	AP
deer	AD	squirrel	AS
elk	AE	vole	AV
gopher	AG	unknown	AU
B: BIRD DAMAGE			
blue grouse	BG	woodpecker	BW
unknown bird	BU		
D: DISEASES			
BROOM RUSTS	DAF	ROOT DISEASES	DR
STEM DECAYS	DD	armillaria root disease *Armillaria ostoyae*	DRA
rust-red stringy rot *Echinodontium tinctorium*	DDE	black stain root disease *Leptographium wageneri*	DRB
pini (red ring) rot *Phellinus pini*	DDP	laminated root rot, cedar strain *Phellinus weirii*	DRC
schweinitz butt rot *Phellinus schweinzi*	DDS	laminated root rot *Phellinus weirii*	DRL
FOLIAGE DISEASES	DA	annosus root disease *Heterobasidion annosum*	DRN
LEADER OR BRANCH DIEBACK	DL	rhizina root disease *Rhizina undulata*	DRR
DWARF MISTLETOES	DM	tomentosus root rot *Inonotus tomentosus*	DRT
Douglas-fir dwarf mistletoe *Arceuthobium douglasii*	DMF	STEM DISEASE (bark cankers and rusts)	DS
hemlock dwarf mistletoe *Arceuthobium tsugense*	DMH	atropellis canker *Atropellis piniphila*	DSA
larch dwarf mistletoe *Arceuthobium laricis*	DML	white pine blister rust *Cronartium ribicola*	DSB
lodgepole pine dwarf mistletoe *Arceuthobium americanum*	DMP	comandra blister rust *Cronartium comandrae*	DSC
		western gall rust *Endocronartium harknessii*	DSG
		stalactiform blister rust *Cronartium stalactiforme*	DSS

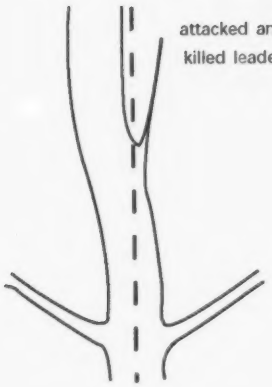
Element Name: Damaging Agent		Form: 3	Cell Reference: 16
Code Definition	**Acceptable Codes**	**Code Definition**	**Acceptable Codes**
I: INSECTS			
APHIDS	IA	western blackheaded budworm *Acleris gloverana*	IDH
balsam woolly adelgid *Adelges piceae*	IAB	western hemlock looper *Lambdina fiscellaria lugubrosa*	IDL
spruce aphid *Elatobium abietinum*	IAS	gypsy moth *Lymantria dispar*	IDM
BARK BEETLES	IB	woolly alder sawfly *Eriocampa ovata*	IDR
western balsam bark beetle *Dryocoetes confusus*	IBB	conifer sawflies *Neodiprion spp.*	IDS
Douglas-fir beetle *Dendroctonus pseudotsugae*	IBD	Douglas-fir tussock moth *Orgyia pseudotsugata*	IDT
mountain pine beetle *Dendroctonus ponderosae*	IBM	western spruce budworm *Choristoneura accidentalis*	IDW
spruce beetle *Dendroctonus rufipennis*	IBS	western false hemlock looper *Neptia freemani*	IDZ
		WOOD BORERS / PHLOEM FEEDERS	IS
western pine beetle *Dendroctonus brevicomis*	IBW	western cedar borer *Trachykele blondeli*	ISB
DEFOLIATORS	ID	Sequoia pitch moth *Synanthedon sequoiae*	ISQ
black army cutworm *Actebia fennica*	IDA	ROOT AND TERMINAL WEEVILS	IW
larch casebearer *Coleophora laricella*	IDC	conifer seedling weevil *Steremnius carinatus*	IWC
spruce budworm *Choristoneura fumiferana*	IDE	lodgepole pine terminal weevil *Pissodes terminalis*	IWP
forest tent caterpillar *Malacosoma disstria*	IDF	white pine (spruce) weevil *Pissodes strobi*	IWS
green-striped forest looper *Melanolophis imitata*	IDG	Warren's root collar weevil *Hylobius warreni*	IWW
N: ABIOTIC INJURIES			
FIRE	NB	FLOODING	NF
DROUGHT	ND	REDBELT	NR
FROST	NG	SLIDE	NS
Frost heaved	NGH	WINDTHROW	NW
Shoot / bud frost kill	NGK	SNOW OR ICE (includes snow press)	NY
HAIL	NH	SUNSCALD	NZ
FUMEKILL	NK		
T: TREATMENT INJURIES			
CHEMICAL	TC		
LOGGING	TL	THINNING OR SPACING	TT
PLANTING	TP	PRUNING	TR
V: VEGETATION PROBLEMS			
HERBACEOUS COMPETITION	VH	SHRUB COMPETITION	VS
VEGETATION PRESS	VP	TREE COMPETITION	VT
Field type: Character		Justification: Character - left	
Sampling Standard: n/a		Example entry: Vegetation Press	V P

Element Name: Severity	Form: 3	Cell Reference: 17

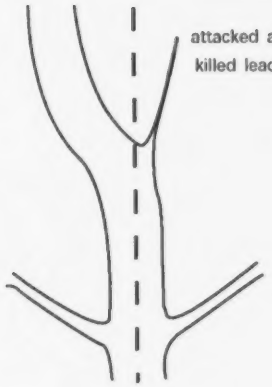
Severity is defined as a categorical rating of damage on an individual tree. Indicate the severity of pest damage.

Code Definition	Acceptable Codes	Code Definition	Acceptable Codes
BARK BEETLE :		STEM RUSTS:	
-Failed attack (FA)	2	- Branch canker	4
-Current/green attack (GR)	6	-Stem canker	5
DEFOLIATORS, NEEDLE RUSTS, AND BLIGHTS: use % of defoliated, discoloured, or infected to determine code; ANIMAL AND BIRD DAMAGE - use % girdled;		-Top kill	6
-≤10%	1	ROOT ROTS:	
-11% - 25%	2	-Light crown symptoms (LC)	3
-26% - 50%	3	- Moderate crown symptoms (MC)	4
- 51% - 75%	4	-Severe crown symptom (SC)	5
- 76% - 90%	5	- Basal resinosis (light) ≥ 50% (RL)	4
- 90% - 100%	6	-Basal resinosis (severe) > 50% (RS)	5
TERMINAL WEEVILS - (See figure 3-1 for defect scale)		-Butt rot (BR)	4
-Minor crook (N)	4	-Mycelial fans (MF)	5
-Major crook (M)	5	DWARF MISTLETOE : Figure 3-2 (Hawksworth's 6-class rating system for all species)	
-Forking (F)	5	-Minor crook (N)	1- 6
-Staghead (S)	5	STEM SWELLING (western hemlock)	
		-at least one minor stem swelling per tree (N)	4
		-at least one major stem swelling per tree (M)	5

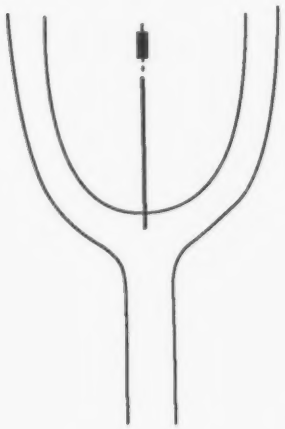
Field type: Character/ numeric	Justification: Character - left; Numeric - right
Sampling Standard: n/a	Example entry: Butt Rot B R 4



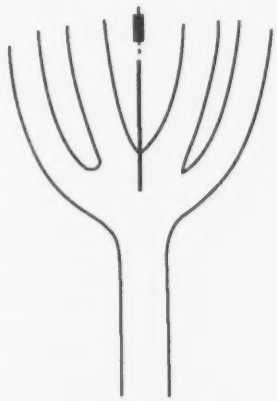
Minor Crook (crease)
A defect consisting of a linear indentation, but little or no stem curvature at point of attack



Major Crook (crease)
A defect defined when a lateral assuming dominance is offset from the main stem by at least 1/2 the stem diameter



Major Forks
A defect resulting when two laterals assume dominance



Staghead
A defect resulting from three or more laterals assuming dominance

FIGURE A3-1 *Terminal Weevil Defect Rating Scale (Forest Productivity Councils of British Columbia 1993)*

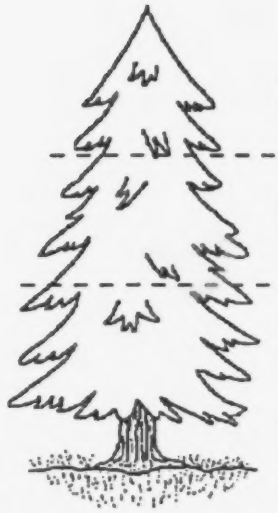
Instructions

Step 1 Divide live crown into thirds

Step 2 Rate each third separately. Each third should be given a rating of 0, 1, or 2 as described below:

(0) No visible infections.
(1) Light infection (1/2 or less of total number of branches in the third infected).
(2) Heavy infection (more than 1/2 of total number of branches in the third infected).

Step 3 Finally, add ratings of thirds to obtain rating for total tree.



Example

If this third has no visible infections its rating is (0).

If this third is lightly infected its rating is (1).

If this third is heavily infected its rating is (2).

The tree in this example gets a rating of :

0 + 1 + 2 = 3.

Coastal Western Hemlock Dwarf Mistletoe Rating System

Instructions

Step 1 Divide live crown into thirds

Step 2 Rate each third separately. Each third should be given a rating of 0, 1, or 2 as described below:

(0) No visible infections.
(1) Light infection (1/2 or less of total number of branches in the third infected).
(2) Heavy infection (more than 1/2 of total number of branches in the third infected).

Step 3 Code each stem swelling as described below:

(N) Minor stem swelling, <25% of bole circumference affected.
(M) Major stem swelling, >25% of bole circumference affected.

Step 4 Finally, add ratings of thirds to obtain rating for total tree. Include code for the stem swelling with the greatest impact.

Example

If this third is lightly infected its rating is (1).

If this third is heavily infected its rating is (2).

Minor stem swelling. This third gets the code (N).

Major stem swelling. This third gets the code (M).

If this third has no visible infections its rating is (0).

The tree in this example gets a rating of 3M.

FIGURE A3-2 *The 6-class Dwarf Mistletoe Rating System (Forest Productivity Councils of British Columbia 1993).*

Element Name: Tree Condition		Form: 3	Cell Reference: 18
Code Definition	**Acceptable Codes**	**Code Definition**	**Acceptable Codes**
Broken top	BT	Tree absent	A
Frost-heaved	FH	Stem bent (seedling)	B
Leaning	L	Stem cut, clipped, broken	C
Chlorotic (yellow)	Y	Tree dead	D
Multiple leaders	ML	Bark peeled or abraded	P
Basal sweep	BS	Stem smashed, crushed, trampled	S
Lammas growth	LG	Other	O
Poor planting microsite	PM		
Field type: Character		Justification: n/a	
Sampling Standard: n/a		Example entry: Broken top	B T

Element Name: Foliage Condition		Form: 3	Cell Reference: 19
Code Definition	**Acceptable Codes**	**Code Definition**	**Acceptable Codes**
Healthy	H	Needles absent, defoliated	A
Chlorotic (yellow)	Y	Browsed	B
Mottled	M	Dead buds on lateral branches	D
Necrotic	N	Others	O
Field type: Character		Justification: n/a	
Sampling Standard: n/a		Example entry: Browsed seedling	B

Element Name: Leader Condition		Form: 3	Cell Reference: 20
Code Definition	**Acceptable Codes**	**Code Definition**	**Acceptable Codes**
Absent or missing	A	Not flushed	N
Browsed	B	Reflushed	R
Curled	C	Snapped broken	S
Forked	F	Dead terminal bud	T
Healthy	H	Stunted needles on the leader	Z
Field type: Character		Justification: n/a	
Sampling Standard: n/a		Example entry: Unflushed bud	N

Element Name: Leader Length (cm)	Form: 3	Cell Reference: 21
Code Definition	**Acceptable Codes**	
Leader length measurements are made to the base of the bud to determine relative growth rates and height increment of the trees for projections.	Must be > 0	
Field type: Numeric	Justification: Right	
Sampling Standard: ±1 cm	Example entry: 70 cm	0 7 0

Element Name: Internodal Length (cm)	Form: 3	Cell Reference: 22
Code Definition	**Acceptable Codes**	
Internodal length is recorded for previous years (year 2 and 3) (1 = year 2, 2 = year 3).	Must be > 0	
Field type: Numeric	Justification: Right	
Sampling Standard: ±1 cm	Example entry: 20 cm	0 2 0

Element Name: Tree Age	Form: 3	Cell Reference: 23
The tree age is its total age including nursery age. In case of young stands, years on-site can be derived from planting date information. In mature stands, age is determined by extracting a sample core using increment borer and counting rings in the sample core.		
Code Definition	**Acceptable Codes**	
Measurements are made at end of the growing season, therefore the current year's growth will count age one year.	Must be a whole number >1	
Field type: Numeric	Justification: Right	
Sampling Standard: ± 1 year	Example entry: 9 years	0 0 9

Element Name: Pathological Indicators		Form: 3	Cell Reference: 24
Pathological indicators are recorded for suspect trees, that is, living trees with one or more external indicator of decay. Record as many as seen (maximum 3).			
Code Definition	**Acceptable Codes**	**Code Definition**	**Acceptable Codes**
Conks: fruiting body of decay fungi	1	Trunk infections of mistletoe	6
Blind conks: pronounced swelling or depression around knots	2	Rotten branches: decayed large branches (diameter > 10 cm)	7
Scars: open or closed scar due to weather (falling branches or blowdown)	3	Dead and/or broken top: Broken or dead leader	8
Fork or crook: result of damage to the main leader	4	Others or unknown	9
Frost crack: may resemble a scar but always follows the grain	5		
Field type: Numeric		Justification: Left (maximum three codes)	
Sampling Standard: n/a		Example entry: Scars due to falling branches	3

Element Name: Position on the Tree (position of pathological indicators on the tree)		Form: 3	Cell Reference: 25
Record each pathological indicator as occuring on the lower, middle, or upper third of the tree (divide tree into thirds).			
Code Definition	**Acceptable Codes**	**Code Definition**	**Acceptable Codes**
Lower third	1	Middle and upper third	5
Middle third	2	Lower and upper third	6
Upper third	3	All thirds	7
Lower and middle third	4		
Field type: Numeric		Justification: Left (maximum three codes)	
Sampling Standard: n/a		Example entry: Scars present on or in lower third of the stem	1

Element Name: Percent Live Crown	Form: 3	Cell Reference: 26
Code Definition	**Acceptable Codes**	
Estimate the length of the tree that is occupied by live crown	0 - 100%	
Field type: Numeric	Justification: Right	
Sampling Standard: ± 5%	Example entry: 25%	0 2 5

Element Name: Tree Acceptability (TA)		Form: 3	Cell Reference: 27
In partial cutting systems, assess the tree's acceptability as leave tree. This is not related to wildlife tree considerations.			
Code Definition	**Acceptable Codes**	**Code Definition**	**Acceptable Codes**
Acceptable	A	Not acceptable	N
Field type: Character		Justification: n/a	
Sampling Standard: n/a		Example entry:	A

APPENDIX 4

Regeneration Performance Assessments (FORM-4)

REGENERATION PERFORMANCE ASSESSMENTS (FORM-4)

1. Administration No.

Forest Cover Map | Opening No. | Block | Installation No. | 2. Site Name | 3. Card of

4. PMP No. | 5. Measurement Date (y m d) | 6. Initials of Recorders | 7. Contractor

8. RMP No.	9. Species	10. Total Trees	11. Layer	WELL SPACED TREES					Comments
				12. No. of Trees	13. Ave. Tree Height (cm)	14. Ave. Leader Length (cm)	15. Age	16. Free Growing	

Instructions for Completing Regeneration Performance Assessments (FORM-4)

Element Name: Administration Number	**Form: 4**	**Cell Reference: 1**
Code Definition	**Acceptable Codes**	
Record the Forest Cover Map sheet number, the opening number, the Block and the Installation number	Forest cover map sheet number Opening no. 001 - 999 Block: cutblock number Installation no. 001 - 999	
Field Type: Number	Justification: Right	
Sampling Standard: n/a	Example entry: 0 9 3 J 0 8 1 0 2 2 0 0 3 0 0 1	

Element Name: Site Name	**Form: 4**	**Cell Reference: 2**
Use the colloquial name for the site, using standard abbreviations for creeks, rivers, or lakes		
Field Type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: Soards Creek	S O A R D S C R K

Element Name: Card Number	**Form: 4**	**Cell Reference: 3**
Code Definition	**Acceptable Codes**	
Page number and number of pages	Whole number > 0	
Field type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: Card 1 of 2	Card: 1 of 2

Element Name: PMP Number	**Form: 4**	**Cell Reference: 4**
Code Definition	**Acceptable Codes**	
Enter the plot number in the installation	Whole number > 0	
Field type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: Plot 1	1

Element Name: Measurement Date	**Form: 4**	**Cell Reference: 5**
Code Definition	**Acceptable Codes**	
Year, month, day		
Field Type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: (Sept. 5, 1996)	1 9 9 6 0 9 0 5

Element Name: Initials of Recorders	Form: 4	Cell Reference: 6
Code Definition	**Acceptable Codes**	
Initials	provide all 3	
Field type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: Andy P. Donut	A P D

Element Name: Contractor	Form: 4	Cell Reference: 7
Code Definition	**Acceptable Codes**	
Up to 8 letters of the contractor's name.		
Field type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: IFS	I F S

Element Name: Regeneration Measurement Plot (RMP) Number		Form: 4	Cell Reference: 8
Code Definition	**Acceptable Codes**	**Code Definition**	**Acceptable Codes**
Northeast	1	Southwest	3
Southeast	2	Northwest	4
Field type: Character		Justification: Left	
Sampling Standard: n/a		Example Entry: Plot 3	3

Element Name: Species		Form: 4	Cell Reference: 9
Code Definition		**Acceptable Codes**	
Tree Species Common Name	Tree Species Latin Name	Code	Subspecies, variety or cultivar
Black cottonwood	*Populus balsamifera* ssp. *trichocarpa* ssp *balsamifera*	Ac	Act Acb
Trembling aspen	*Populus tremuloides*	At	
Amabilis fir/balsam fir	*Abies amabilis*	Ba	
Grand fir	*Abies grandis*	Bg	
Subalpine fir	*Abies lasiocarpa*	Bl	
Noble fir	*Abies procera*	Bn	
Western redcedar	*Thuja plicata*	Cw	
Red alder	*Alnus rubra*	Dr	
Paper birch	*Betula papyrifera*	Ep	
Douglas-fir	*Pseudotsuga menziesii*, interior and coastal varieties	Fd	Fdi Fdc

Element Name: Species		**Form: 4**	**Cell Reference: 9**
Code Definition		**Acceptable Codes**	
Tree Species Common Name	Tree Species Latin Name	Code	Subspecies, variety or cultivar
Mountain hemlock	*Tsuga mertensiana*	Hm	
Western hemlock	*Tsuga heterophylla*	Hw	
Alpine larch	*Larix lyallii*	La	
Tamarack	*Larix laricina*	Lt	
Western larch	*Larix occidentalis*	Lw	
Whitebark pine	*Pinus albicaulis*	Pa	
Limber pine	*Pinus flexilis*	Pf	
Jack pine	*Pinus banksiana*	Pj	
Lodgepole pine	*Pinus contorta*, interior and coastal varieties	Pl	Pli Plc
Western white pine	*Pinus monticola*	Pw	
Ponderosa pine/yellow pine	*Pinus ponderosa*	Py	
Black spruce	*Picea mariana*	Sb	
Englemann spruce	*Picea engelmannii*	Se	
Sitka spruce	*Picea sitchensis*	Ss	
White spruce	*Picea glauca*	Sw	
Hybrid spruce	*Picea hybrids*, white x black, white x Engelmann, white x Sitka, Englemann x Sitka, white x Engelmann x Sitka, Sitka x unknown hybrid	Sx	Sxb Sxw Sxl Sxe Sxx Sxs
Yellow cedar	*Chamaecyparis nootkatensis*	Yc	
Field type: Character		Justification: Left	
Sampling Standard: n/a		Example entry: (interior) lodgepole pine	P l i

Element Name: Total Trees or Density	**Form: 4**	**Cell Reference: 10**
Code Definition	**Acceptable Codes**	
A count for the given species in each RMP. This includes both acceptable and unacceptable trees for each species.	Must be a whole number	
Field type: Numeric	Justification: Right	
Sampling Standard: n/a	Example entry: 29 trees	0 2 9

Element Name: Layer		Figure: 4-1	Form: 4	Cell Reference: 11
Code Definition	**Acceptable Codes**	**Code Definition**		**Acceptable Codes**
Mature layer: ≥ 12.5 cm dbh	L1	Sapling layer: ≥1.3 m in height - 7.4 cm dbh		L3
Pole layer: ≥ 12.5 cm dbh	L2	Regeneration layer: <1.3 m in height		L4
Field type: Character/ Numeric		Justification: Left		
Sampling Standard: n/a		Example entry: Sapling ≥ 1.3 m	L	3

Element Name: Number of Trees	Form: 4	Cell Reference: 12
Code Definition	**Acceptable Code**	
Record the number of well-spaced trees for each species. These trees are assessed using the target ideal inter-tree spacing, with allowance down to the target minimum.	Must be whole number	
Field type: Numeric	Justification: Right	
Sampling Standard: n/a	Example entry: 10 trees are well spaced	1 0

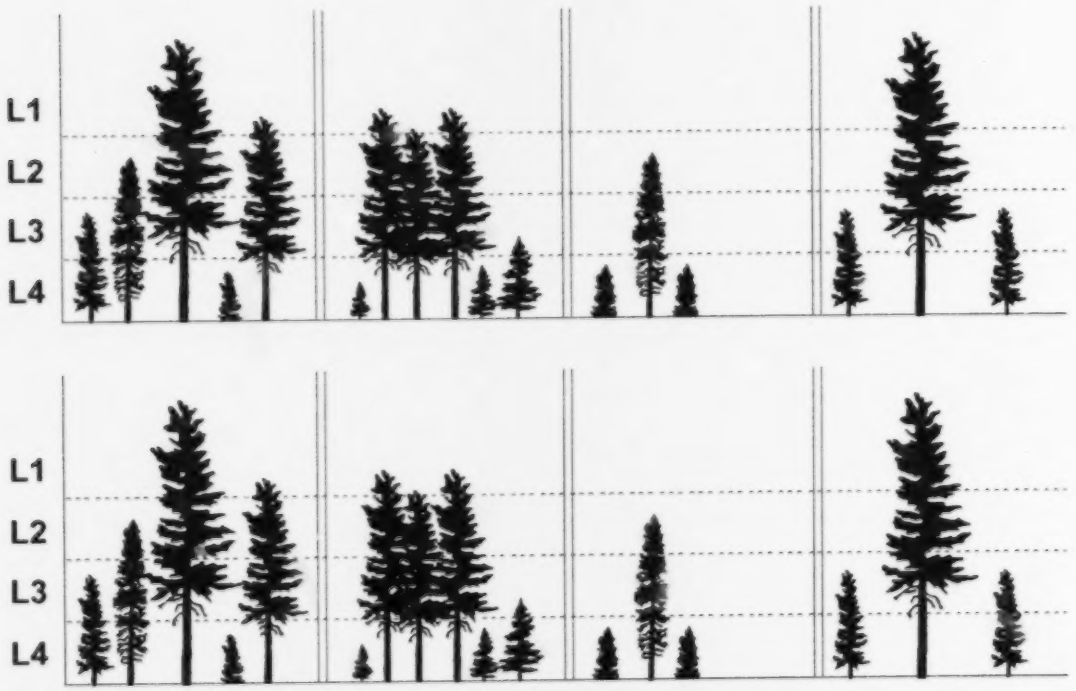


FIGURE A4-1 *Stand structures suitable for multi-storey surveys (Forest Practices Code of British Columbia 1995).*

Element Name: Average Tree Height (cm)	Form: 4	Cell Reference: 13
Code Definition	**Acceptable Codes**	
Average tree height is recorded (to the nearest cm) for well spaced trees tallied in each RMP. Height measurements are taken to the base of the bud.	Must be a whole number > 0	
Field type: Numeric	Justification: Right	
Sampling Standard: ± 0.1 cm	Example entry: 122 cm	1 2 2

Element Name: Average Leader Length (cm)	Form: 4	Cell Reference: 14
Code Definition	**Acceptable Codes**	
Average leader length is recorded for well-spaced trees tallied in each RMP and measurements are taken to the base of the bud.	Must be > 0	
Field type: Numeric	Justification: Right	
Sampling Standard: ± 0.1 cm	Example entry: 50.2 cm	5 0 • 2

Element Name: Tree Age	Form: 4	Cell Reference: 15
The tree age is the total age including nursery age. Years on-site can be derived from planting date information.		
Code Definition	**Acceptable Codes**	
Measurements are made at end of the growing season, therefore the current year's growth will count age one year.	Must be a whole number >1	
Field type: Numeric	Justification: Right	
Sampling Standard: ± 1 year	Example entry: 5 years	0 0 5

Element Name: Free Growing	Form: 4	Cell Reference: 16
Code Definition	**Acceptable Code**	
Enter the number of well-spaced acceptable trees that meet the free-growing criteria based on Silviculture Prescription and Regional Stocking Standards.	Must be whole number	
Field type: Numeric	Justification: Right	
Sampling Standard: n/a	Example entry: 4 trees are free to grow	0 4

APPENDIX 5

Vegetation Measurements (FORM-5)

VEGETATION MEASUREMENTS (FORM-5)

1. Administration No.
Forest Cover Map | Opening No. | Block | Installation No.

2. Site Name

3. Card ___ of ___

4. PMP No.

5. Measurement Date (y m d)

6. Initials of Recorders

7. Contractor

VEGETATION		RMP NO. 1				RMP NO. 2				RMP NO. 3				RMP NO. 4			
8. Species	9. Layer	10. Percent Cover	11. D	12. Modal Height (m)	13.* Density (#/plot)	10. Percent Cover	11. D	12. Modal Height (m)	13.* Density (#/plot)	10. Percent Cover	11. D	12. Modal Height (m)	13.* Density (#/plot)	10. Percent Cover	11. D	12. Modal Height (m)	13.* Density (#/plot)
ALL																	
CONIFERS																	
HARDWOOD																	
SHRUBS																	
HERBS																	

COMMENTS

* Record density for conifers and hardwoods

Instructions for Completing Vegetation Measurements (FORM-5)

Element Name: Administration Number	**Form: 5**	**Cell Reference: 1**
Code Definition	**Acceptable Codes**	
Record the Forest Cover Map sheet number, the opening number, the Block and the Installation number	Forest cover map sheet number Opening no. 001 - 999 Block: cutblock number Installation no. 001 - 999	
Field Type: Numeric	Justification: Right	
Sampling Standard: n/a	Example entry: 0 9 3 J 0 8 1 0 2 2 0 0 3 0 0 1	

Element Name: Site Name	**Form: 5**	**Cell Reference: 2**
Use the colloquial name for the site, using standard abbreviations for creeks, rivers, or lakes		
Field Type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: Soards Creek S O A R D S C R K	

Element Name: Card Number	**Form: 5**	**Cell Reference: 3**
Code Definition	**Acceptable Codes**	
Page number and number of pages	A whole number > 0	
Field type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: Card 1 of 2	Card: 1 of 2

Element Name: PMP Number	**Form: 5**	**Cell Reference: 4**
Code Definition	**Acceptable Codes**	
Enter the plot number in the installation	A whole number > 0	
Field type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: Plot 1	1

Element Name: Measurement Date	**Form: 5**	**Cell Reference: 5**
Code Definition	**Acceptable Codes**	
Year, month, day		
Field Type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: (Sept. 5, 1996)	1 9 9 6 0 9 0 5

Element Name: Initials of Recorders	Form: 5	Cell Reference: 6
Code Definition	**Acceptable Codes**	
Initials	provide all 3	
Field type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: Andy P. Donut	A P D

Element Name: Contractor	Form: 5	Cell Reference: 7
Code Definition	**Acceptable Codes**	
Up to 8 letters of the contractor's name		
Field type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: IFS	I F S

Element Name: Vegetation Species	Form: 5	Cell Reference: 8
Code Definition	**Acceptable Codes**	
Record the first 4 letters of the genus and the first 3 letters of the species. Where the genus is known but the species is not, then record the genus name (using up to seven letters). Unknown species should have a sample collected for later identification.	Use all UPPERCASE (block) letters for plant names for clarity	
Field type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: *Oryzopsis pungens*	O R Y Z P U N

Element Name: Vegetation Layer		Figure: 5-1	Form: 5	Cell Reference: 9
Code Definition	**Acceptable Codes**	**Code Definition**	**Acceptable Codes**	
Veterans	A0	Germinants (< 2 yrs, < 10 cm and < 1.3 m ht)	A6	
Dominant	A1	Tall Shrubs: >1.3 m in height	B1	
Main Canopy	A2	Low Shrubs: ≤1.3 m in height	B2	
Poles (≥ 10 m and/or ≥ 7.5 cm dbh)	A3	Herbs	C	
Sapling (≥ 1.3 m and < 10 m ht)	A4	Mosses, Lichens, Liverworts	D	
Seedling (> 2 yrs, > 10 cm and < 1.3 m ht)	A5			
Field type: Character/ Numeric		Justification: Left		
Sampling Standard: n/a		Example entry: Low shrub	B	2

FIGURE A5-1 *Vegetation stratification of forest stand—tree and shrub layers (after Luttmerding et al. 1990)*

* *Some exceptions for very low-growing shrubs.*

Element Name: Percent Cover	**Form: 5**	**Cell Reference: 10**
Percent cover is the percent of the ground area covered by a vertical projection of the crown onto subplot ground surface		
Code Definition	**Acceptable Codes**	
Note that total percent cover of all species within and between layers can add up to >100%. For species that are present but with cover significantly less than 1% a "+" should be entered as the percent cover.	Must be a whole number ≥ 0 and ≤ 100	
Field type: Numeric	Justification: Right	
Sampling Standard: Record to the nearest %, ± 5%	Example entry: 19%	1 9

Element Name: Distribution Codes (D)	**Form: 5**	**Cell Reference: 11**
Code Definition	**Acceptable Codes**	
Rare individual, a single occurrence	1	
A few sporadically occurring individuals	2	
A single patch or clump of a species	3	
Several sporadically occurring individuals	4	
A few patches or clumps of a species	5	

Element Name: Distribution Codes	Form: 5	Cell Reference: 11
Code Definition	**Acceptable Codes**	
Several well-spaced patches or clumps	6	
Continuous, uniform occurrence of well-spaced individuals	7	
Continuous occurrence of a few species with gaps in the distribution	8	
Continuous dense occurrence of a species	9	
Field type: Numeric	Justification: Left	
Sampling Standard: n/a	Example entry: Continuous, uniform occurrence	7

Element Name: Species Modal Height (m)	Form: 5	Cell Reference: 12	
Code Definition	**Acceptable Codes**		
An estimate for the given species and layer is acceptable	Must be a number between 0.01 and 99.99		
Field type: Numeric	Justification: Decimal aligned		
Sampling Standard: ± 0.1 m or 10%	Example entry: 0.19 m	0 • 1	9

Element Name: Density (number of stems per plot)	Form: 5	Cell Reference: 13	
Code Definition	**Acceptable Codes**		
Count the coniferous and deciduous species for plot	Must be a whole number		
Field type: Numeric	Justification: Right		
Sampling Standard: n/a	Example entry: 29	2	9

APPENDIX 6

Competition Measurements (FORM-6)

COMPETITION MEASUREMENTS (FORM-6)

1 Administration No

Forest Cover Map | Opening No | Block | Installation No

2 Site Name

3 Card ___ of ___

4 PMP No

5 Measurement Date (y m d)

6 Initials of Recorders

7 Contractor

1.78m plot ☐ 2.52m plot ☐

8 Species	9 Tree No	10 Percent Cover	11 Modal Height (m)	12 Distance (m)	13 Density (#/plot)	14 D	9 Tree No	10 Percent Cover	11 Modal Height (m)	12 Distance (m)	13 Density (#/plot)	14 D	9 Tree No	10 Percent Cover	11 Modal Height (m)	12 Distance (m)	13 Density (#/plot)	14 D
ALL																		
CONIFERS																		
HARDWOODS																		
SHRUBS																		
HERBS																		
ALL																		
CONIFERS																		
HARDWOODS																		
SHRUBS																		
HERBS																		
ALL																		
CONIFERS																		
HARDWOODS																		
SHRUBS																		
HERBS																		

COMMENTS

EXPLORE

Instructions for Completing Competition Measurements (FORM-6)

Element Name: Administration Number	**Form: 6**	**Cell Reference: 1**
Code Definition	**Acceptable Codes**	
Record the Forest Cover Map sheet number, the opening number, the Block and the Installation number	Forest cover map sheet number Opening no. 001 - 999 Block: cutblock number Installation no. 001 - 999	
Field Type: Numeric	Justification: Right	
Sampling Standard: n/a	Example entry: 0 9 3 J 0 8 1 0 2 2 0 0 3 0 0 1	

Element Name: Site Name	**Form: 6**	**Cell Reference: 2**
Use the colloquial name for the site, using standard abbreviations for creeks, rivers, or lakes		
Field Type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: Soards Creek S O A R D S C R K	

Element Name: Card Number	**Form: 6**	**Cell Reference: 3**
Code Definition	**Acceptable Codes**	
Page number and number of pages	A whole number > 0	
Field type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: Card 1 of 2	Card: 1 of 2

Element Name: PMP Number	**Form: 6**	**Cell Reference: 4**
Code Definition	**Acceptable Codes**	
Enter the plot number in the installation	A whole number > 0	
Field type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: Plot 1	1

Element Name: Measurement Date	**Form: 6**	**Cell Reference: 5**
Code Definition	**Acceptable Codes**	
Year, month, day		
Field Type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: (Sept. 5, 1996)	1 9 9 6 0 9 0 5

Element Name: Initials of Recorders	Form: 6	Cell Reference: 6
Code Definition	**Acceptable Codes**	
Record initials of both crew members	Provide all 3	
Field type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: Andy P. Donut	A P D

Element Name: Contractor	Form: 6	Cell Reference: 7
Code Definition	**Acceptable Codes**	
Up to 8 letters of the contractor's name		
Field type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: IFS	I F S

Element Name: Vegetation Species	Form: 6	Cell Reference: 8
Code Definition	**Acceptable Codes**	
Record the first 4 letters of the genus and the first 3 letters of the species. Where the genus is known but the species is not, then record the genus name (using up to seven letters). Unknown species should have a sample collected for later identification.	Use all UPPERCASE (block) letters for plant names for clarity	
Field type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: *Oryzopsis pungens*	O R Y Z P U N

Element Name: Tree Number	Form: 6	Cell Reference: 9
Code Definition	**Acceptable Codes**	
Paint numbers on all trees with dbh ≥ 7.5 cm	Must be a whole number between 0 and 9999	
Field type: Numeric	Justification: Right	
Sampling Standard: n/a	Example entry: 3434	3 4

Element Name: Percent Cover	Form: 6	Cell Reference: 10
Percent cover is the percent of the ground area covered by a vertical projection of the crown onto subplot ground surface		
Code Definition	**Acceptable Codes**	
Note that total percent cover of all species within and between layers can add up to >100%. For species which are present but whose cover is significantly less than 1% a "+" should be entered for percent cover.	Must be a whole number ≥ 0 and ≤100	
Field type: Numeric	Justification: Right	
Sampling Standard: Record to the nearest %, ± 5%	Example entry: 19%	1 9

Element Name: Species Modal Height (m)	Form: 6	Cell Reference: 11
Code Definition	**Acceptable Codes**	
An estimate for the given species and layer is acceptable	Must be a number between 0.01 and 99.99	
Field type: Numeric	Justification: Decimal aligned	
Sampling Standard: ± 0.01 m or 10%	Example entry: 0.19 m	0 • 1 9

Element Name: Proximity or Distance (cm)	Form: 6	Cell Reference: 12
Code Definition	**Acceptable Codes**	
n/a	Must be a whole number	
Field type: Numeric	Justification: Decimal aligned	
Sampling Standard: ± 1 cm	Example entry: 33 cm	0 3 3

Element Name: Density (number of stems per plot)	Form: 6	Cell Reference: 13
Code Definition	**Acceptable Codes**	
Count the coniferous and deciduous species in plot	Must be a whole number	
Field type: Numeric	Justification: Right	
Sampling Standard: n/a	Example entry: 29 stems	2 9

Element Name: Distribution Codes	Form: 6	Cell Reference: 14
Code Definition	**Acceptable Codes**	
Rare individual, a single occurrence	1	
A few sporadically occurring individuals	2	
A single patch or clump of species	3	
Several sporadically occurring individuals	4	
A few patches or clumps of a species	5	
Several well-spaced patches or clumps	6	
Continuous, uniform occurrence of well-spaced individuals	7	
Continuous occurrence of a few species with gaps in the distribution	8	
Continuous dense occurrence of a species	9	
Field type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: Continuous, well-spaced	7

APPENDIX 7

Site Index Measurements (FORM-7)

SITE INDEX MEASUREMENTS (FORM-7)

1. Administration No.
Forest Cover Map | Opening No. | Block | Installation No.

2. Site Name

3. Card ___ of ___

4. PMP No.

5. Measurement Date
y m d

6. Initials of Recorders

7. Contractor

Pre-Harv.	
Post-Harv.	

TOP HEIGHT TREE MEASUREMENT REQUIREMENTS

Plot Radius	11.28 m	12.62 m	13.82 m	14.93 m	15.96 m	16.93 m	17.84 m
Plot Area	0.04 ha	0.05 ha	0.06 ha	0.07 ha	0.08 ha	0.09 ha	0.1 ha
Number of Trees for each Species of Interest	4	5	6	7	8	9	10

8. Layer	9. Tree No.	10. Species	11. Breast Height Age	12. Years to bh	13. Total Age	14. Last 10 Yr. (cm)	15. Last 20 Yr. (cm)	16. Total Core Length	17. Rot Length (cm)
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						.	.		

8. Layer	9. Tree No.	10. Species	18. Top % (+)	19. Bottom % (+/-)	20. Total	21. Slope Dist. (m)	22. Horizontal Dist. (m)	23. Height (m)	24. Height correction	25. Total Height (m)
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COMMENTS:

Instructions for Completing Site Index Measurements (FORM-7)

Element Name: Administration Number	Form: 7	Cell Reference: 1
Code Definition	**Acceptable Codes**	
Record the Forest Cover Map sheet number, the opening number, the Block and the Installation number	Forest cover map sheet number Opening no. 001 - 999 Block: cutblock number Installation no. 001- 999	
Field Type: Number	Justification: Right	
Sampling Standard: n/a	Example entry: 0 9 3 J 0 8 1 0 2 2 0 0 3 0 0 1	

Element Name: Site Name	Form: 7	Cell Reference: 2
The colloquial name for the site, using standard abbreviations for creeks, rivers, or lakes		
Field Type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: Soards Creek S O A R D S C R K	

Element Name: Card Number	Form: 7	Cell Reference: 3
Code Definition	**Acceptable Codes**	
Page number and number of pages	A whole number > 0	
Field type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: Card 1 of 2	Card: 1 of 2

Element Name: PMP Number	Form: 7	Cell Reference: 4
Code Definition	**Acceptable Codes**	
Enter the plot number in the installation	A whole number > 0	
Field type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: Plot 1	1

Element Name: Measurement Date	Form: 7	Cell Reference: 5
Code Definition	**Acceptable Codes**	
Year, month, day		
Field Type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: (Sept. 5, 1996)	1 9 9 6 0 9 0 5

Element Name: Initials of Recorders	Form: 7	Cell Reference: 6
Code Definition	**Acceptable Codes**	
Record initials of both crew members	provide all 3	
Field type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: Andy P. Donut	A P D

Element Name: Contractor	Form: 7	Cell Reference: 7
Code Definition	**Acceptable Codes**	
Up to 8 letters of the contractor's name		
Field type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: IFS	I F S

Element Name: Layer	Form: 7	Cell Reference: 8
Code Definition	**Acceptable Codes**	
Dominants	A1	
Co-dominants	A2	
Sampling Standard: n/a	Example entry: A2 Co-dominants	A2

Element Name: Tree Number	Form: 7	Cell Reference: 9
Code Definition	**Acceptable Codes**	
Enter the number of the tree sampled from the tree tag	Must be a whole number between 0 and 9999	
Field type: Numeric	Justification: Right	
Sampling Standard: n/a	Example entry: 32	0 0 3 2

Element Name: Species		Form: 7	Cell Reference: 10
Code Definition		**Acceptable Codes**	
Tree Species Common Name	Tree Species Latin Name	Code	Subspecies, variety or cultivar
Black cottonwood	*Populus balsamifera* ssp. *trichocarpa* ssp. *balsamifera*	Ac	Act Acb
Trembling aspen	*Populus tremuloides*	At	
Amabilis fir/balsam fir	*Abies amabilis*	Ba	
Grand fir	*Abies grandis*	Bg	
Subalpine fir	*Abies lasiocarpa*	Bl	
Noble fir	*Abies procera*	Bn	
Western redcedar	*Thuja plicata*	Cw	

Element Name: Species		Form: 7	Cell Reference: 10
Code Definition		**Acceptable Codes**	
Tree Species Common Name	Tree Species Latin Name	Code	Subspecies, variety or cultivar
Red alder	*Alnus rubra*	Dr	
Paper birch	*Betula papyrifera*	Ep	
Douglas-fir	*Pseudotsuga menziesii*, interior and coastal varieties	Fd	Fdi Fdc
Mountain hemlock	*Tsuga mertensiana*	Hm	
Western hemlock	*Tsuga heterophylla*	Hw	
Alpine larch	*Larix lyallii*	La	
Tamarack	*Larix laricina*	Lt	
Western larch	*Larix occidentalis*	Lw	
Whitebark pine	*Pinus albicaulis*	Pa	
Limber pine	*Pinus flexilis*	Pf	
Jack pine	*Pinus banksiana*	Pj	
Lodgepole pine	*Pinus contorta*, interior and coastal varieties	Pl	Pli Plc
Western white pine	*Pinus monticola*	Pw	
Ponderosa pine/yellow pine	*Pinus ponderosa*	Py	
Black spruce	*Picea mariana*	Sb	
Englemann spruce	*Picea engelmannii*	Se	
Sitka spruce	*Picea sitchensis*	Ss	
White spruce	*Picea glauca*	Sw	
Hybrid spruce	*Picea hybrids*, white x black, white x Engelmann, white x Sitka, Englemann x Sitka, white x Engelmann x Sitka, Sitka x unknown hybrid	Sx	Sxb Sxw Sxl Sxe Sxx Sxs
Yellow cedar	*Chamaecyparis nootkatensis*	Yc	
Field type: Character		Justification: Left	
Sampling Standard: n/a		Example entry: (interior) lodgepole pine	P l i

Element Name: Breast Height Age	Form: 7	Cell Reference: 11
Code Definition	**Acceptable Codes**	
Breast height age is measured by boring at 1.3 m above the base of the tree on uphill side and counting the rings in a sample core. The pith counts as one year and the sample core must lie within three years of the pith.	Must be a whole number between 0 and 999	
Field type: Numeric	Justification: Right	
Sampling Standard: ± 1 year	Example entry: 30	0 3 0

Element Name: Years to Breast Height	Form: 7	Cell Reference: 12
Code Definition	**Acceptable Codes**	
To determine total age, the correction is added to the breast height age to account for the number of years the tree took to reach breast height, since breast height age reflects growth past this age.	Must be a whole number between 0 and 99	
Field type: Numeric	Justification: Right	
Sampling Standard: n/a	Example entry: 7 years	0 7

Element Name: Total Age	Form: 7	Cell Reference: 13
Code Definition	**Acceptable Codes**	
Total height is determined by adding breast height age and correction factor	Must be a whole number between 0 and 999	
Field type: Numeric	Justification: Right	
Sampling Standard: n/a	Example entry: 30 years + 7 years	0 3 7

Element Name: Radial Growth in the last 10 Years (cm)	Form: 7	Cell Reference: 14
Code Definition	**Acceptable Codes**	
Measurement must be recorded in the field due to probable shrinkage of the core during the period between collection and age counting at the designated place.	Must be a decimal number > 0.0	
Field type: Numeric	Justification: Decimal aligned	
Sampling Standard: ± 0.1 cm	Example entry: 1.7 cm	1 • 7

Element Name: Radial Growth in the last 20 Years (cm)	Form: 7	Cell Reference: 15
Code Definition	**Acceptable Codes**	
Measurement must be recorded in the field due to probable shrinkage of the core during the period between collection and age counting at the designated place.	Must be a decimal number > 0.0	
Field type: Numeric	Justification: Right	
Sampling Standard: ± 0.1 cm	Example entry: 21.7 cm	2 1 • 7

Element Name: Total Length of the Core (cm)	Form: 7	Cell Reference: 16
Code Definition	Acceptable Codes	
Rot length is included in total core length measurements	Must be a decimal number > 0.0	
Field type: Numeric	Justification: Right	
Sampling Standard: ± 0.1 cm	Example entry: 18.7 cm	1 8 • 7

Element Name: Rot Length (cm)	Form: 7	Cell Reference: 17
Code Definition	Acceptable Codes	
Measure the length of the rot in total core length	Must be a decimal number > 0.0	
Field type: Numeric	Justification: Right	
Sampling Standard: ± 0.1 cm	Example entry: 5.7 cm	5 • 7

Element Name: Top %	Form: 7	Cell Reference: 18
Code Definition	Acceptable Codes	
Percent slope reading to the top of the tree. Sign must be shown and usually it is "+."	Must be a whole number between 0 and 100	
Field type: Numeric	Justification: Right	
Sampling Standard: n/a	Example entry: 85%	+ 0 8 5

Element Name: Bottom %	Form: 7	Cell Reference: 19
Code Definition	Acceptable Codes	
Percent slope reading to the base of the tree or to the lowest visible point. Sign must be shown and may be + or -.	Must be a whole number between 0 and 100	
Field type: Numeric	Justification: Right	
Sampling Standard: n/a	Example entry: - 10%	- 0 1 0

Element Name: Total	Form: 7	Cell Reference: 20
Code Definition	Acceptable Codes	
This value is the algebraic subtraction of Top % and Bottom % readings	Must be a whole number between 0 and 100	
Field type: Numeric	Justification: Right	
Sampling Standard: n/a	Example entry: 85 - (-10)	0 9 5

Element Name: Slope Distance (m)	Form: 7	Cell Reference: 21
Code Definition	**Acceptable Codes**	
Slope distance is the distance from point of measurement to the centre of the tree trunk at breast height	Must be a decimal number ≥ 0.0	
Field type: Numeric	Justification: Decimal aligned	
Sampling Standard: ± 0.1 m	Example entry:	1 2 • 1

Element Name: Horizontal Distance (m)	Form: 7	Cell Reference: 22
Code Definition	**Acceptable Codes**	
Horizontal distance obtained by multiplying the slope distance by a slope distance factor	Must be a decimal number ≥ 0.0	
Field type: Numeric	Justification: Right	
Sampling Standard: ± 0.1 m	Example entry: 12.1 x 0.725 = 8.77	0 8 • 8

Element Name: Height (m)	Form: 7	Cell Reference: 23
Code Definition	**Acceptable Codes**	
Calculate the height using the data collected (total slope x horizontal distance / 100)	Must be a decimal number ≥ 0.0	
Field type: Numeric	Justification: Right	
Sampling Standard: 0.1 m	Example entry: 95 x 8.8/100 = 8.36	0 8 • 4

Element Name: Height Correction (m)	Form: 7	Cell Reference: 24
Code Definition	**Acceptable Codes**	
If bottom reading was not taken at the base of the tree, record the height at which it was taken	Must be a decimal number ≥ 0.0	
Field type: Numeric	Justification: Right	
Sampling Standard: ± 0.1 m	Example entry: 0.5 m	0 0 • 5

Element Name: Total Height (m)	Form: 7	Cell Reference: 25
Code Definition	**Acceptable Codes**	
Calculate total height by adding the height correction to the height	Must be a decimal number ≥ 0.0	
Field type: Numeric	Justification: Right	
Sampling Standard: n/a	Example entry: 8.4 m + 0.5 m = 8.9 m	0 8 • 9

APPENDIX 8

Coarse Woody Debris Assessments (FORM-8)

COARSE WOODY DEBRIS ASSESSMENTS (FORM-8)

1. Administration No.
Forest Cover Map | Opening No. | Block | Installation No.

2. Site Name

3. Card ___ of ___

4. PMP No.

5. Measurement Date
y m d

6. Initials of Recorders

7. Contractor

8. Azimuth (degrees)

Line 1	
Line 2	

Serial Number	COARSE WOODY DEBRIS TRANSECT 1					
	9. Species	10. Diameter (cm)	11. DC	12. Angle (deg.)	13. >3 m	14. PR
		.				
		.				
		.			

Instructions for Completing Coarse Woody Debris Assessments (FORM-8)

Element Name: Administration Number	**Form: 8**	**Cell Reference: 1**
Code Definition	**Acceptable Codes**	
Administration number consists of the Forest Cover Map sheet number, the opening number, the Block and the Installation number	Forest cover map sheet number Opening no. 001 - 999 Block: cutblock number Installation no. 001 - 999	
Field Type: Number	Justification: Right	
Sampling Standard: n/	Example entry: 0 9 3 J 0 8 1 0 2 2 0 0 3 0 0 1	

Element Name: Site Name	**Form: 8**	**Cell Reference: 2**
Use the colloquial name for the site, using standard abbreviations for creeks, rivers, or lakes		
Field Type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: Soards Creek S O A R D S C R K	

Element Name: Card Number	**Form: 8**	**Cell Reference: 3**
Code Definition	**Acceptable Codes**	
Page number and number of pages	A whole number > 0	
Field type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: Card 1 of 2	Card: 1 of 2

Element Name: PMP Number	**Form: 8**	**Cell Reference: 4**
Code Definition	**Acceptable Codes**	
Enter the plot number in the installation	A whole number > 0	
Field type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: Plot 1	1

Element Name: Measurement Date	**Form: 8**	**Cell Reference: 5**
Code Definition	**Acceptable Codes**	
Year, month, day		
Field Type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: (Sept. 5, 1996)	1 9 9 6 0 9 0 5

Element Name: Initials of Recorders	Form: 8	Cell Reference: 6
Code Definition	**Acceptable Codes**	
Initials	provide all 3	
Field type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: Andy P. Donut	A P D

Element Name: Contractor	Form: 8	Cell Reference: 7
Code Definition	**Acceptable Codes**	
Up to 9 letters of the contractor's name		
Field type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: IFS	I F S

Element Name: Azimuth	Form: 8	Cell Reference: 8
Code Definition	**Acceptable Codes**	
	0-360 degrees	
Field type: Numeric	Justification: Right	
Sampling Standard: ± 1 degree	Example entry: 163°	A P D

Element Name: Species		Form: 8	Cell Reference: 9
Tree species are recorded using the same codes as for standing trees. If the species cannot be determined put "U" for unknown.			
Code Definition		**Acceptable Codes**	
Tree Species Common Name	Tree Species Latin Name	Code	Subspecies, variety or cultivar
Black cottonwood	*Populus balsamifera* ssp. *trichocarpa* ssp. *balsamifera*	Ac	Act Acb
Trembling aspen	*Populus tremuloides*	At	
Amabilis fir/balsam fir	*Abies amabilis*	Ba	
Grand fir	*Abies grandis*	Bg	
Subalpine fir	*Abies lasiocarpa*	Bl	
Noble fir	*Abies procera*	Bn	
Western redcedar	*Thuja plicata*	Cw	
Red alder	*Alnus rubra*	Dr	
Paper birch	*Betula papyrifera*	Ep	
Douglas-fir	*Pseudotsuga menziesii*, interior and coastal varieties	Fd	Fdi Fdc
Mountain hemlock	*Tsuga mertensiana*	Hm	

Element Name: Species		**Form: 8**	**Cell Reference: 9**
Tree species are recorded using the same codes as for standing trees. If the species cannot be determined put "U" for unknown.			
Code Definition		**Acceptable Codes**	
Tree Species Common Name	Tree Species Latin Name	Code	Subspecies, variety or cultivar
Western hemlock	*Tsuga heterophylla*	Hw	
Alpine larch	*Larix lyallii*	La	
Tamarack	*Larix laricina*	Lt	
Western larch	*Larix occidentalis*	Lw	
Whitebark pine	*Pinus albicaulis*	Pa	
Lumber pine	*Pinus flexilis*	Pf	
Jack pine	*Pinus banksiana*	Pj	
Lodgepole pine	*Pinus contorta*, interior and coastal varieties	Pl	Pli Plc
Western white pine	*Pinus monticola*	Pw	
Ponderosa pine/yellow pine	*Pinus ponderosa*	Py	
Black spruce	*Picea mariana*	Sb	
Englemann spruce	*Picea engelmannii*	Se	
Sitka spruce	*Picea sitchensis*	Ss	
White spruce	*Picea glauca*	Sw	
Hybrid spruce	*Picea hybrids*, white x black, white x Engelmann, white x Sitka, Englemann x Sitka, white x Engelmann x Sitka, Sitka x unknown hybrid	Sx	Sxb Sxw Sxl Sxe Sxx Sxs
Yellow-cedar	*Chamaecyparis nootkatensis*	Yc	
Unknown		U	
Field type: Character		Justification: Left	
Sampling Standard: n/a		Example entry: lodgepole pine (interior)	P l i

Element Name: Diameter (cm)	**Form: 8**	**Cell Reference: 10**
Code Definition	**Acceptable Codes**	
The diameter of the piece is taken perpendicular to the bole at the point of sampling line intersection. Diameter is recorded if it is greater than 7.5 cm.	Must be a decimal number >0.0	
Field type: Numeric	Justification: Right	
Sampling Standard: 1 decimal place (± 0.1 cm)	Example entry: 14.8 cm	1 4 • 8

Element Name: DECAY CLASS	Form: 8	Cell Reference: 11
Code Definition	**Acceptable Codes**	
POSITION: elevated on support point; TWIGS (< 3 cm): present; BARK: intact; SHAPE: round; TEXTURE: intact, hard; INVADING ROOTS: none	1	
POSITION: elevated but sagging slightly; TWIGS (< 3 cm): absent; BARK: intact or partly missing; SHAPE: round; TEXTURE: intact, hard to partly decaying; INVADING ROOTS: none	2	
POSITiON: sagging near ground or broken; TWIGS (< 3 cm): absent; BARK: Trace; SHAPE: round; TEXTURE: hard, large pieces, partly decaying; INVADING ROOTS: in sapwood.	3	
POSITION: all of log on ground, sinking; TWIGS (< 3 cm): absent; BARK: absent; SHAPE: round to oval; TEXTURE: small blocky pieces; INVADING ROOTS: in heartwood.	4	
POSITION: all of log on ground, partly sunken; TWIGS (< 3 cm): absent; BARK: absent; SHAPE: oval; TEXTURE: many small pieces, soft portions; INVADING ROOTS: in heartwood.	5	
Field type: Numeric	Justification: Right	
Sampling Standard: n/a	Example entry: 4	4

Element Name: Tilt Angle	Form: 8	Cell Reference: 12
Code Definition	**Acceptable Codes**	
The tilt angle refers to the tilt of the individual log away from the horizontal, regardless of the slope. A clinometer is placed on the surface of the piece at the point of the intercept measurement and the angle from horizontal (in degrees) is recorded.	0-90 degrees	
Field type: Numeric	Justification: Right	
Sampling Standard: ±1 degree	Example entry: 63°	6 3

Element Name: Length > 3 m	Form: 8	Cell Reference: 13
Code Definition	**Acceptable Codes**	
Piece is more than 3 m in length	1	
Piece is less than 3 m in length	2	
Sampling Standard: n/a	Example entry: length 4 m	

Element Name: Products to be removed	Form: 8	Cell Reference: 14
To provide information whether the material is a product likely to be removed from the site at some time in the future.		
Sampling Standard: n/a	Example entry:	X

Element Name: Length (m)	Form: 8	Cell Reference: 15
Code Definition	**Acceptable Codes**	
Measurement of odd-shaped pieces or accumulations. Cross-sectional area is used to record the length.	Must be ≥ 0	
Field type: Numeric	Justification: Right	
Sampling Standard: 1 decimal place (± 0.1 m)	Example entry: 3.5 m	3 • 5

Element Name: Depth (m)	Form: 8	Cell Reference: 16
Code Definition	**Acceptable Codes**	
Measurement of odd-shaped pieces or accumulations. Use the average depth of the accumulation by species.	Must be ≥ 0	
Field type: Numeric	Justification: Right	
Sampling Standard: 1 decimal place (± 0.1 m)	Example entry: 3.5 m	3 • 5

APPENDIX 9

Prescribed Fire Fuel Assessments (FORM-9)

PRESCRIBED FIRE FUEL ASSESSMENTS (FORM-9)

1. Administration No.
Forest Cover Map | Opening No. | Block | Installation No.

2. Site Name

3. Card ___ of ___

4. PMP No.

5. Measurement Date

	y	m	d
Pre-fire			
Post-fire			

6. Initials of Recorders

7. Contractor

Line	Species and diameter (cm) of slash pieces ≥ 7 cm diameter									
	8. Species									
A	9. Pre-fire diam.									
	10. Post-fire diam.									
B	9. Pre-fire diam.									
	10. Post-fire diam.									
C	9. Pre-fire diam.									
	10. Post-fire diam.									

Line	Intersection by slash pieces < 7 cm diameter					
	Diameter class	0-0.5	0.6-1.0	1.1-3.0	3.1-5.0	5.1-7.0
	Line length	5 m	10 m	15 m	20 m	25 m
A	11. Pre-fire tally					
	12. Post-fire tally					
B	11. Pre-fire tally					
	12. Post-fire tally					
C	11. Pre-fire tally					
	12. Post-fire tally					

13. % Species composition of slash < 7 cm diameter				
Sp.				
Line A				
Line B				
Line C				

14. % Mineral Soil Exposure			
Line	A	B	C
Pre-burn			
Post-burn			

Line	15. Pre-burn depth of mosses and litter (cm)									
	5 m		10 m		15 m		20 m		25 m	
	In	Out	In	Out	In	Out	In	Out	In	Out
A										
B										
C										

Line	16. Depth of burn (cm)																	
A																		
B																		
C																		

Line	17. Post-burn duff depth (cm)									
	5 m		10 m		15 m		20 m		25 m	
	In	Out	In	Out	In	Out	In	Out	In	Out
A										
B										
C										

EXPLORE

Instructions for Completing Prescribed Fire Fuel Assessments (FORM-9)

Element Name: Administration Number	**Form: 9**	**Cell Reference: 1**
Code Definition	**Acceptable Codes**	
Record the Forest Cover Map sheet number, the opening number, the Block and the Installation number	Forest cover map sheet number Opening no. 001 - 999 Block: cutblock number Installation no. 001 - 999	
Field Type: Number	Justification: Right	
Sampling Standard: n/a	Example entry: 093J081022003001	

Element Name: Site Name	**Form: 9**	**Cell Reference: 2**
Use the colloquial name for the site, using standard abbreviations for creeks, rivers, or lakes		
Field Type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: Soards Creek	SOARDS CRK

Element Name: Card Number	**Form: 9**	**Cell Reference: 3**			
Code Definition	**Acceptable Codes**				
Page number and number of pages	A whole number > 0				
Field type: Numeric	Justification: n/a				
Sampling Standard: n/a	Example entry: Card 1 of 2	Card:	1	of	2

Element Name: FMP Number	**Form: 9**	**Cell Reference: 4**
Code Definition	**Acceptable Codes**	
Enter the plot number in the installation	A whole number > 0	
Field type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: Plot 1	1

Element Name: Measurement Date	**Form: 9**	**Cell Reference: 5**
Code Definition	**Acceptable Codes**	
Year, month, day		
Field Type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: (Sept. 5, 1996)	19960905

Element Name: Initials of Recorders	Form: 9	Cell Reference: 6
Code Definition	**Acceptable Codes**	
Record initials of both crew members	provide all 3	
Field type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: Andy P. Donut	A P D

Element Name: Contractor	Form: 9	Cell Reference: 7
Code Definition	**Acceptable Codes**	
Up to 8 letters of the contractor's name		
Field type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: IFS	I F S

Element Name: Species		Form: 9	Cell Reference: 8
Code Definition		**Acceptable Codes**	
Tree Species Common Name	Tree Species Latin Name	Code	Subspecies, variety or cultivar
Black cottonwood	*Populus balsamifera* ssp. *trichocarpa* ssp *balsamifera*	Ac	Act Acb
Trembling aspen	*Populus tremuloides*	At	
Amabilis fir/balsam fir	*Abies amabilis*	Ba	
Grand fir	*Abies grandis*	Bg	
Subalpine fir	*Abies lasiocarpa*	Bl	
Noble fir	*Abies procera*	Bn	
Western redcedar	*Thuja plicata*	Cw	
Red alder	*Alnus rubra*	Dr	
Paper birch	*Betula papyrifera*	Ep	
Douglas-fir	*Pseudotsuga menziesii*, interior and coastal varieties	Fd	Fdi Fdc
Mountain hemlock	*Tsuga mertensiana*	Hm	
Western hemlock	*Tsuga heterophylla*	Hw	
Alpine larch	*Larix lyallii*	La	
Tamarack	*Larix laricina*	Lt	
Western larch	*Larix occidentalis*	Lw	
Whitebark pine	*Pinus albicaulis*	Pa	
Limber pine	*Pinus flexilis*	Pf	

Element Name: Species		**Form: 9**	**Cell Reference: 8**
Code Definition		**Acceptable Codes**	
Tree Species Common Name	Tree Species Latin Name	Code	Subspecies, variety or cultivar
Jack pine	*Pinus banksiana*	Pj	
Lodgepole pine	*Pinus contorta*, interior and coastal varieties	Pl	Pli Plc
Western white pine	*Pinus monticola*	Pw	
Ponderosa pine/yellow pine	*Pinus ponderosa*	Py	
Black spruce	*Picea mariana*	Sb	
Englemann spruce	*Picea engelmannii*	Se	
Sitka spruce	*Picea sitchensis*	Ss	
White spruce	*Picea glauca*	Sw	
Hybrid spruce	*Picea hybrids*, white x black, white x Engelmann, white x Sitka, Englemann x Sitka, white x Engelmann x Sitka, Sitka x unknown hybrid	Sx	Sxb Sxw Sxl Sxe Sxx Sxs
Yellow cedar	*Chamaecyparis nootkatensis*	Yc	
Field type: Character		Justification: Left	
Sampling Standard: n/a		Example entry: lodgepole pine (interior)	P l i

Element Name: Pre-fire Diameter (cm)	**Form: 9**	**Cell Reference: 9**
To estimate slash load present on the site		
Code Definition	**Acceptable Codes**	
The diameter of the piece is taken perpendicular to the piece at the point of intersection with the sampling line. Record diameter if it is > 7.0 cm.	Must be a decimal number > 0.0	
Field type: Numeric	Justification: Decimal aligned	
Sampling Standard: ± 0.1 cm	Example entry: 34.8 cm	3 4 • 8

Element Name: Post-fire Diameter (cm)	**Form: 9**	**Cell Reference: 10**
Code Definition	**Acceptable Codes**	
The diameter of the piece is taken perpendicular to the piece at the point of intersection with the sampling line. Record diameter if it is > 7.0 cm.	Must be a decimal number >0.0	
Field type: Numeric	Justification: Decimal aligned	
Sampling Standard: ± 0.1 cm	Example entry: 10.8 cm	1 0 • 8

Element Name: Pre-fire Tally	**Form: 9**	**Cell Reference: 11**
Provide a tally of slash pieces smaller than 7 cm diameter present on the transect lines		
Code Definition	**Acceptable Codes**	
Tally the number of pieces in each diameter class. Use the appropriate line length for each diameter class.	Must be a whole number	
Field type: Numeric	Justification: Right	
Sampling Standard: ± 2	Example entry:	1 6 8

Element Name: Post-fire Tally	**Form: 9**	**Cell Reference: 12**
Provide a tally of slash pieces smaller than 7 cm diameter present in the plot after prescribed fire treatment		
Code Definition	**Acceptable Codes**	
Tally the number of pieces in each diameter class. Use the appropriate line length for each diameter class.	Must be a whole number	
Field type: Numeric	Justification: Right	
Sampling Standard: ± 2	Example entry:	1 6 8

Element Name: % Species Composition	**Form: 9**	**Cell Reference: 13**
Code Definition	**Acceptable Codes**	
After completing the count (cell no. 11 and 12), estimate the percent (nearest 5%) species composition of all pieces less than 7 cm in diameter for the transect line. Use information in cell 8 for species code.	Whole number	
Sampling Standard: ± 5%	Example entry: 65%	6 5

Element Name: % Mineral Soil Exposure	**Form: 9**	**Cell Reference: 14**
Code Definition	**Acceptable Codes**	
Walk along each transect line and estimate the proportion of exposed mineral soil before and after burn	Whole number	
Sampling Standard: ± 5%	Example entry: 35%	3 5

Element Name: Pre-burn depth of Mosses and Litter (cm)	**Form: 9**	**Cell Reference: 15**
Code Definition	**Acceptable Codes**	
Install the depth-of-burn pins at 10 points per transect line. Pins should be located 1 m to the right and left of the measurement point. Measure the depth from the bottom of the crossbar to the top of the partially-to-well-decomposed materials (duff).	Must be a decimal number > 0.0	
Field type: Numeric	Justification: Right	
Sampling Standard: ± 0.5 cm	Example entry: 7.5 cm	7 • 5

Element Name: Depth of Burn (cm)	Form: 9	Cell Reference: 16
Code Definition	**Acceptable Codes**	
Relocate the depth-of-burn pins along the sampling line. Measure the depth from the bottom of the crossbar to the top of the unburned forest floor or to the mineral soil.	Must be a decimal number > 0.0	
Field type: Numeric	Justification: Right	
Sampling Standard: ± 0.5 cm	Example entry: 3.5 cm	3 • 5

Element Name: Post-burn Depth of Duff (cm)	Form: 9	Cell Reference: 17
To measure the depth of duff remaining on the transect lines		
Code Definition	**Acceptable Codes**	
Relocate the depth-of-burn pins along the sampling line. Measure the depth from the top of the unburned forest floor to the mineral soil. Install the depth-of-burn pins at 10 points per transect line.	Must be a decimal number > 0.0	
Field type: Numeric	Justification: Right	
Sampling Standard: ± 0.5 cm	Example entry: 3.5 cm	3 • 5

APPENDIX 10

Site Disturbance Assessments (FORM-10)

SITE DISTURBANCE ASSESSMENTS (FORM-10)

1. Administration No.

Forest Cover Map | Opening No. | Block | Installation No. | 2. Site Name | 3. Card of

4. PMP No. | 5. Measurement Date (y m d) | 6. Initials of Recorders | 7. Contractor

8.Tran-sect No.	9.Distance (m)	10. Disturb. Type	11 Length (cm)	12 Width (cm)	13. Depth in Hum.	13. Depth in Min.	14.Soil Type

8.Tran-sect No.	9.Distance (m)	10. Disturb. Type	11 Length (cm)	12 Width (cm)	13. Depth (cm) Hum.	13. Depth (cm) Min.	14.Soil Type

COMMENTS:

EXPLORE

Instructions for Completing Site Disturbance Assessments (FORM-10)

Element Name: Administration Number	**Form: 10**	**Cell Reference: 1**
Code Definition	**Acceptable Codes**	
Record the Forest Cover Map sheet number, the opening number, the Block and the Installation number	Forest cover map sheet number Opening no. 001 - 999 Block: cutblock number Installation no. 001 - 999	
Field Type: Number	Justification: Right	
Sampling Standard: n/a	Example entry:	0 9 3 J 0 8 1 0 2 2 0 0 3 0 0 1

Element Name: Site Name	**Form: 10**	**Cell Reference: 2**
Use the colloquial name for the site, using standard abbreviations for creeks, rivers, or lakes		
Field Type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: Soards Creek	S O A R D S C R K

Element Name: Card Number	**Form: 10**	**Cell Reference: 3**			
Code Definition	**Acceptable Codes**				
Page number and number of pages	A whole number > 0				
Field type: Numeric	Justification: n/a				
Sampling Standard: n/a	Example entry: Card 1 of 2	Card:	1	of	2

Element Name: PMP Number	**Form: 10**	**Cell Reference: 4**
Code Definition	**Acceptable Codes**	
Enter the plot number in the installation	A whole number > 0	
Field type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: Plot 1	1

Element Name: Measurement Date	**Form: 10**	**Cell Reference: 5**
Code Definition	**Acceptable Codes**	
Year, month, day		
Field Type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: (Sept. 5, 1996)	1 9 9 6 0 9 0 5

Element Name: Initials of Recorders	Form: 10	Cell Reference: 6
Code Definition	**Acceptable Codes**	
Record initials of both crew members	provide all 3	
Field type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: Andy P. Donut	A P D

Element Name: Contractor	Form: 10	Cell Reference: 7
Code Definition	**Acceptable Codes**	
Up to 10 letters of the contractor's name		
Field type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: IFS	I F S

Element Name: Transect Number	Form: 10	Cell Reference: 8
Code Definition	**Acceptable Codes**	
Transect lines are drawn at 5 m spacing on a 50 m grid in each direction		
Transect Lines (North-South)	1-11	
Transect Lines (East-West)	12-22	
Field type: Numeric	Justification: Right	
Sampling Standard: n/a	Example entry: 3	3

Element Name: Distance (m)	Form: 10	Cell Reference: 9
Code Definition	**Acceptable Codes**	
Record the distance of a transect line where disturbance is first encountered	Must be a whole number (e.g., 5, 10, 15)	
Field type: Numeric	Justification: Right	
Sampling Standard: ± 0.1 m	Example entry: 15.5 m	1 5 • 5

Element Name: Disturbance Type	**Form: 10**	**Cell Reference: 10**
Code Definition	**Acceptable Codes**	
Dispersed trail (Wheel or track ruts: impressions or ruts caused by equipment traffic and are at least 30 cm wide and 2 m long - 15 cm deep rut: depth 15 cm at the deepest point -5 cm deep rut: count both 15 cm deep ruts and ruts at least 5 cm deep into mineral soil	T	
Dispersed trail (repeated machine traffic): i.e. skid trails	E	
Deep gouges: are excavations into mineral soil that are deeper than 30 cm, or to bedrock at the survey point	G	
Long gouges: have mineral soil gouged deeper than 5 cm, or to bedrock on 100 percent of an area of 1 × 3 m	L	
Wide gouges: have mineral soil gouged deeper than 5 cm at the survey point and deeper than 5 cm or to bedrock on at least 80 percent of an area of 1.8 × 1.8 m	W	
Very wide scalp: are areas where the forest floor has been removed at the survey point from over 80 percent of an area 3 × 3 m	V	
Wide scalps: are areas where the forest floor has been removed at the survey point from over 80 percent of an area 1.8 × 1.8 m	S	
Continuous scalps: are areas where the forest floor has been removed at the survey point (as described for very wide scalp) and continuously for a length greater than 5 m. There is no width criterion for this category.	C	
Not surveyed (points fall on a permanent landing)	X	
Field type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: Skid roads	R

Element Name: Disturbance Length (cm)	**Form: 10**	**Cell Reference: 11**
Code Definition	**Acceptable Codes**	
Record the length of the disturbance that is intersected by the transect	Must be a whole number ≥ 0	
Field type: Numeric	Justification: Right	
Sampling Standard: ±1 cm	Example entry: 20 cm	2 0

Element Name: Disturbance Width (cm)	**Form: 10**	**Cell Reference: 12**
Code Definition	**Acceptable Codes**	
Record the width of the disturbance that is intersected by the transect	Must be a whole number ≥ 0	
Field type: Numeric	Justification: Right	
Sampling Standard: ±1 cm	Example entry: 12 cm	1 2

Element Name: Disturbance Depth (cm)	**Form: 10**	**Cell Reference: 13**
Code Definition	**Acceptable Codes**	
Record the depth that the disturbance penetrates into the humus and the mineral soil	Must be a whole number ≥ 0	
Field type: Numeric	Justification: Right	
Sampling Standard: ±1 cm	Example entry: 24 cm	2 4

APPENDIX 11

Light Measurements (FORM-11)

LIGHT MEASUREMENTS (FORM-11)

1. Administration No.

Forest Cover Map | Opening No. | Block | Installation No.

2. Site Name

3. Card of

4. PMP No.

5. Measurement Date (y / m / d)

6. Initials of Recorders

7. Contractor

8. Start time (hour / min) AM / PM

9. Finish time (hour / min) AM / PM

10. Tree No.	11. Species	12. PPFD $\mu mol/m^{-2}S^{-1}$) MEASUREMENT POINT				13. Tree height (m)	14. Veg. height (m)
		Above canopy	Top of seedling	Mid-crown	Crown base		
						.	.
						.	.
						.	.

Instructions for Completing Light Measurements (FORM-11)

Element Name: Administration Number	**Form: 11**	**Cell Reference: 1**
Code Definition	**Acceptable Codes**	
Record the Forest Cover Map sheet number, the opening number, the Block and the Installation number	Forest cover map sheet number Opening no. 001 - 999 Block: cutblock number Installation no. 001 - 999	
Field Type: Number	Justification: Right	
Sampling Standard: n/a	Example entry: 0 9 3 J 0 8 1 0 2 2 0 0 3 0 0 1	

Element Name: Site Name	**Form: 11**	**Cell Reference: 2**
Use the colloquial name for the site, using standard abbreviations for creeks, rivers, or lakes		
Field Type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: Soards Creek S O A R D S C R K	

Element Name: Card Number	**Form: 11**	**Cell Reference: 3**			
Code Definition	**Acceptable Codes**				
Page number and number of pages	A whole number > 0				
Field type: Numeric	Justification: n/a				
Sampling Standard: n/a	Example entry: Card 1 of 2	Card:	1	of	2

Element Name: PMP Number	**Form: 11**	**Cell Reference: 4**
Code Definition	**Acceptable Codes**	
Enter the plot number in the installation	A whole number > 0	
Field type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: Plot 1	1

Element Name: Measurement Date	**Form: 11**	**Cell Reference: 5**
Code Definition	**Acceptable Codes**	
Year, month, day		
Field Type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: (Sept. 5, 1996)	1 9 9 6 0 9 0 5

Element Name: Initials of Recorders	Form: 11	Cell Reference: 6
Code Definition	**Acceptable Codes**	
Record initials of both crew members	provide all 3	
Field type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: Andy P. Donut	A P D

Element Name: Contractor	Form: 11	Cell Reference: 7
Code Definition	**Acceptable Codes**	
Up to 10 letters of the contractor's name		
Field type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: IFS	I F S

Element Name: Measurement Start Time	Form: 11	Cell Reference: 8
Code Definition	**Acceptable Codes**	
Hour, minutes		
Field type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: 11:45 AM	1 1 4 5 A M
		P M

Element Name: Measurement Finish Time	Form: 11	Cell Reference: 9
Code Definition	**Acceptable Codes**	
Hour, minutes		
Field type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: 1:15 PM	0 1 1 5 P M

Element Name: Tree Number	Form: 11	Cell Reference: 10
Code Definition	**Acceptable Codes**	
Enter tree number from tree tag	Must be a whole number between 0 and 9999	
Field type: Numeric	Justification: Right	
Sampling Standard: n/a	Example entry:	1 0 6

Element Name: Species		**Form: 11**	**Cell Reference: 11**
Code Definition		**Acceptable Codes**	
Tree Species Common Name	Tree Species Latin Name	Code	Subspecies, variety or cultivar
Black cottonwood	*Populus balsamifera* ssp. *trichocarpa* ssp. *balsamifera*	Ac	Act Acb
Trembling aspen	*Populus tremuloides*	At	
Amabilis fir/balsam fir	*Abies amabilis*	Ba	
Grand fir	*Abies grandis*	Bg	
Subalpine fir	*Abies lastocarpa*	Bl	
Noble fir	*Abies procera*	Bn	
Western redcedar	*Thuja plicata*	Cw	
Red alder	*Alnus rubra*	Dr	
Paper birch	*Betula papyrifera*	Ep	
Douglas-fir	*Pseudotsuga menziesii*, interior and coastal varieties	Fd	Fdi Fdc
Mountain hemlock	*Tsuga mertensiana*	Hm	
Western hemlock	*Tsuga heterophylla*	Hw	
Alpine larch	*Larix lyallii*	La	
Tamarack	*Larix laricina*	Lt	
Western larch	*Larix occidentalis*	Lw	
Whitebark pine	*Pinus albicaulis*	Pa	
Limber pine	*Pinus flexilis*	Pf	
Jack pine	*Pinus banksiana*	Pj	
Lodgepole pine	*Pinus contorta*, interior and coastal varieties	Pl	Pli Plc
Western white pine	*Pinus monticola*	Pw	
Ponderosa pine/yellow pine	*Pinus ponderosa*	Py	
Black spruce	*Picea mariana*	Sb	
Englemann spruce	*Picea engelmannii*	Se	
Sitka spruce	*Picea sitchensis*	Ss	
White spruce	*Picea glauca*	Sw	
Hybrid spruce	*Picea hybrids*, white x black, white x Engelmann, white x Sitka, Englemann x Sitka, white x Engelmann x Sitka, Sitka x unknown hybrid	Sx	Sxb Sxw Sxl Sxe Sxx Sxs

Element Name: Species		**Form: 11**	**Cell Reference: 11**
Code Definition		**Acceptable Codes**	
Tree Species Common Name	Tree Species Latin Name	Code	Subspecies, variety or cultivar
Yellow-cedar	*Chamaecyparis nootkatensis*	Yc	
Field type: Character		Justification: Left	
Sampling Standard: n/a		Example entry: lodgepole pine (interior)	P | l | i

Element Name: PPFD Measurements (µmol m^{-2} S^{-1})	**Form: 11**	**Cell Reference: 12**
Code Definition	**Acceptable Codes**	
Light measurements will be recorded: a) above canopy; b) top whorl of crop seedling; c) mid-crown; and d) crown base. Ceptometer will be placed on the south side of the seedling to avoid shading by the tree	Must be a whole number	
Field type: Numeric	Justification: Right	
Sampling Standard: ± 0.1 cm	Example entry:	| | 4 | 5 | 8

Element Name: Tree Height (m)	**Form: 11**	**Cell Reference: 13**
Code Definition	**Acceptable Codes**	
Note: Height measurements are to the base of the bud. Measurement to the top of the bud would result in incorrectly double-counting the height of the bud, and the height increment (leader length) and tree height increments would not add correctly.	Must be > 0	
Field type: Numeric	Justification: Decimal aligned	
Sampling Standard: 2 decimal places (± 2 cm)	Example entry: 1.52 m	1 • 5

Element Name: Vegetation Modal Height (m)	**Form: 11**	**Cell Reference: 14**
Estimate common vegetation height around the seedlings competing for light		
Code Definition	**Acceptable Codes**	
An estimate for the given vegetation is acceptable	Must be a whole number	
Field type: Numeric	Justification: Decimal aligned	
Sampling Standard: n/a	Example entry:	0 | 0 • 9 | 9

APPENDIX 12

List of Equipment and Supplies

List of Equipment and Supplies

Number	Equipment	Supplies
Installation Establishment		
1	Silva compass	1 m long metal rebars for Treatment Unit corners
2	Clinometer	White PVC posts
3	Pocket calculator	1 m long aluminum tubing for PMPs and RMPs centres
4	Plot string	50 cm long metal rebars for PMP centre
5	Diameter measuring tape	60 cm (1¼" x 1¼" x $^{3}/_{16}$" x 24") angle aluminum stakes for PMPs, RMPs and gridpoints
6	Metal loggers' tape	Aluminum tags
7	Scout axe	Plastic ties, electrical wire, copper wire, or aluminum nails
8	Claw hammer	Tree tags
9	Felt pen	Notebook
10	Ruler	Flagging tape
11	Shovel	Film roll
12	Field reference guides	Set of EXPLORE Installation Forms
13	Increment borer	Safety gear (hard hat, first aid kit, flare kit)
14	Straw for increment cores	Stapler
15	Camera	White loggers' paint
Remeasurements		
1	Silva compass	Cedar or aluminum stakes (60 cm long)
2	Clinometer	Flagging tape (blue and red)
3	Pocket calculator	Notebook
4	Plot string	Set of EXPLORE Installation Forms
5	Diameter measuring tape	
6	Metal loggers' tape	
7	Scout axe	
8	Claw hammer	
9	Felt pen	
10	Ruler	
11	Height pole	
12	Calipers	
14	Field reference guides	
15	Increment borer	
16	Straw for increment cores	
17	Camera	

Aluminum Tag Description

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EXPLORE

INSTALLATION I.D. _____
LOCATION _____
TOTAL PLOTS _____
TO: PLOT CENTRE: ❒
AZIMUTH TO C _____°
AZIMUTH TO T _____°
DISTANCE TO C _____ m
DISTANCE TO T _____ m
TO: TIE POINT: ❒
AZIMUTH TO C _____°
DISTANCE TO C _____ m
LOCATION _____
DATE _____/_____/_____
CREW _____

RESEARCH BRANCH
MINISTRY OF FORESTS

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